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# Techno-Economic Survey of Kerala

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National Council of Applied Economic Research.
New Delhi

[Title Page]

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# Preface

THE TECHNO-ECONOMIC Survey of Kerala, conducted at the request of the State 114 Government of Kerala, is one of the last few in the series of Techno-Economic Surveys of the various States of India undertaken by the National Council of Applied Economic Research. For some time past this small State has been attracting increasing attention of the public. Although Kerala has come into 121 limelight on account of its political turmoils, the basic problems which the State faces are primarily economic in nature. The acute intensity of its unemployment aggravated by increased population pressure, the relatively lower per capita income of the people of the State, and highly limited scope for extension of cultivable area, pose a challenging task for the economic planners.

The main objective of the Techno-Economic Survey of Kerala, as in the case of similar surveys for other States, has been to assess technically feasible and economically viable potential for growth in the different sectors of the State economy over the coming decade. The first step towards this objective was to prepare an outline of the present structure of the economy and make an assessment of the existing physical and human resources of the State. A team of economists and technical experts was 114 constituted for this purpose. The preliminary work on the project was started early in 1960. Relevant data were collected and the members of the survey team discussed the problems and potentialities in different fields, with a number of knowledgeable persons in the State. A number of working papers dealing with problems and 128 potentialities in respect of various aspects of the economy were also prepared. Technical Appraisal Reports analysing growth potential in different sectors were then prepared by the technical members of the team.

The Preliminary Economic Report was ready by September 1961 and it was sent to the State Government for comments. The final report as printed here brings together the material contained in the working papers and the Appraisal Reports. The Appraisal Reports contain a detailed technical analysis of each of the major fields of development, e.g., Industry, Power, Transport, etc. The Economic Report, on the other hand, aims at presenting a broad and coordinated picture of the outline of the probable growth of the State Economy. It indicates the main lines along which future development of the State should proceed and highlights the strategy required for achieving a rapid growth of the State economy.

The economy of Kerala is marked by a number of distinctive features. It is the 161 most thickly populated State in India with an average density per square mile being over three times the all-India average. In addition, the rate of growth of population has been noticeably higher in Kerala than in the other parts of India. A high density of population combined with a fast growth of population has been responsible [464]

161 for the most acute problem of Kerala, viz., abnormally high rate of unemployment.
414 According to a survey carried out by the State Statistics Department open unemployment
in the State was as high as 4.2 per cent (all-India 0.6%) and under-employment
9.6 per cent of the total population (all-India 6.0%).

464 The unemployment problem of Kerala might not have been so severe had there
been a correspondingly rapid development of industries over the past few decades.
*433 In this sphere the State suffers from certain handicaps. Although the industrial
47 sector in Kerala absorbs a high proportion of the working force (Kerala 19.1%;
India 9.4%), the majority of them are engaged in very low productivity industries. The two major industries of Kerala, viz., coir and cashewnut are technologically very backward. Coir industry, which is organized as a cottage industry, absorbs 4-5 lakh persons. Cashewnut-processing, although organized on the lines of factory industry, is almost entirely unmechanized. As a result, labour productivity in the secondary sector is extremely low. Because of this, industrial sector in Kerala does not create any sizeable reinvestible surplus and the process of capital formation is hampered. The types of industries in which Kerala predominates, have not also aided the development of entrepreneurial talents. Kerala lacks in a long tradition of industrial enterprise. Most of the large scale industries which now exist in Kerala, for example, Fertilizers & Chemicals Travancore Ltd., Travancore-Cochin Chemicals Ltd., Indian Aluminium Company and Aluminium Industries Ltd., were started under the direct initiative of the governments of the erstwhile States of Travancore and Cochin or industrialists from other neighbouring States of India. No distinct body of local entrepreneurship has, therefore, developed in the State.

135 In addition, lack of sizable mineral deposits (except Ilmenite) adds to the
438 difficulties which have been retarding industrial development of the State. Coal
*433 as well as all metallic raw materials for the industries of Kerala have to be transported
over long distances from other parts of the country. But there are favourable
factors compensating some of these deficiencies in the economic endowments of the
241 State. The agricultural sector of Kerala abounds in a rich variety of high value
434 yielding cash crops like coconut, pepper, rubber, arecanut, tea, cashewnut, cardamom
and coffee. These crops not only provide considerable incomes for the farmers, but
439 are a good source of foreign exchange earnings and provide valuable raw materials
*433 for the industries. A vast potential for generation of low-cost hydro-electric power
makes up for the absence of fossil fuels. Rich forest and fishery resources, a highly intelligent and literate labour force, easy accessibility to most parts of the State through a wide network of roadways, and the scenic beauty of its landscape capable of attracting tourists, are some of the other assets of Kerala.

*433 As a result of the present survey, several lines of technically and economically
434 feasible developments have been suggested in this report in the industrial and other
fields. The total impact of these developments would be to raise the per capita income of the State from the present level of Rs. 240 (at 1955-56 prices) to Rs. 404 (at the same price level) by 1970-71. State income would rise from Rs. 400 crores (at 1955-56 prices) to Rs. 812.8 crores, i.e., at an average annual rate of 10.3 per cent. The targets are undoubtedly on the high side, but the needs of Kerala in the context of its huge unemployment and very low per capita income demand a rather high

rate of growth if economic and social stability is to be attained within a reasonable 433*
period. 434

Growth of this magnitude can be achieved in a balanced manner over the decade through an increase of about 60 per cent in the income from primary sector, 175 per cent from the industrial sector, and 103 per cent from the tertiary sector. Sectoral growth rates of this magnitude would bring about structural changes in the economy. Over the decade the proportion of income contributed by agriculture and other primary activities would decline from 48.2 per cent to 42.8 per cent while that from secondary sector would increase from 15.7 per cent to 21.2 per cent. Income from the tertiary sector would remain more or less constant around 36 per cent.
Similarly the inter-sectoral distribution of working force would undergo changes. By 433*
1971 the proportion of employment in the primary sector would decline from 54.9 464
per cent in 1956 to 42.2 per cent while in the secondary and tertiary sectors it would increase from 19.3 per cent to 24.6 per cent and 25.8 per cent to 33.2 per cent, respectively.

In planning the strategy of growth for Kerala two important factors need to be 433*
stressed: (*a*) a proper system of crop priorities in the sphere of agricultural development and (*b*) technological improvements in the industrial sector.

In the sphere of agriculture, the trend of thinking up till now has been to emphasize the need for achieving self-sufficiency in foodgrains within the State. This has led to a sizable increase in the area under foodgrains at the expense of high value adding cash crops, despite the fact that Kerala offers highly favourable conditions for cash crop cultivation. The right policy for the State Government to adopt would be (*a*) to meet its foodgrains deficit by import from surplus States and (*b*) to reserve to the maximum extent all new lands coming under cultivation, for cash crops.

For raising the yield of foodgrains, a programme of widespread use of improved seeds, intensive use of fertilizers, control of soil erosion and provision of major and minor irrigation have been suggested. It is estimated that over the decade the various measures contained in the report would raise the output of foodgrains by 7.28 lakh tons. By 1970-71, the output of foodgrains would be about 16.5 lakh tons leaving a big gap to be filled by imports from other surplus States.

This report does not agree with the view sometimes propounded that the need for providing irrigation facilities is less in this State because rainfall is high. Irrigation is essential for double or triple cropping, stabilization of crops and for effective application of fertilizers. Moreover, in view of the terrain of Kerala, it is also necessary to develop irrigation facilities through minor irrigation schemes. Irrigation projects suggested in the report therefore require an investment of Rs. 39 crores in major works and Rs. 20 crores in minor works.

The need for a faster pace of industrialization than achieved hitherto is particularly urgent in Kerala in view of the high man-land ratio already attained in this State. There is a limit beyond which employment in the agricultural sector cannot be increased. A solution to the key problem of Kerala, viz., high degree of unemployment, can therefore be attempted only by further industrialization of the State. Industrial development will also be the main spearhead of overall growth of the State economy.

* 433 In the sphere of industries, the major emphasis has been placed on the expansion of engineering industries. Out of a total investment of Rs. 145 crores in the factory industries, the engineering industries alone will absorb nearly Rs. 63 crores. The majority of light engineering industries to be established or expanded are high value adding industries and would cater to regional demand for implements, tools and other engineering goods. The capital-output ratio for these industries is also comparatively low, viz., 2.1. These are some of the factors on account of which a large scale expansion of engineering industries would be quite feasible in Kerala although the raw materials required by them would have to be imported from other parts of India over long distances. A large scale expansion of engineering industries would help to improve the technological level of other industries and agriculture in Kerala. Apart from being themselves technologically superior, the engineering industries induce technological improvements in other spheres and spread the use of better equipment, tools and machines.

For a steady growth of industries in a State like Kerala where the industrialists have been shy of investing on account of its unstable political climate, it is most essential to take all possible measures to inculcate a sense of confidence among the investor class. The State Government's recent Industrial Policy Declaration expressing their desire to give all possible help to prospective entrepreneurs, marks a step in the right direction. However, the State Government alone may not be able to go far in this matter unless they have the active cooperation of the public and political parties in the execution of their economic policies.

371 One of the chief assets of Kerala from the point of view of its future industrialization programmes is its vast resources of hydro-electric power. During the Second Plan period unfortunately, signs of power shortage were visible and the growth of industries had to suffer as a consequence. For the coming years the State should keep ahead of demand for power and should plan for surplus power generation capacity. Secondly, since the State has plenty of power resources and the costs of generation are very low, it would be in the interest of the economy of the Southern region of India to form a zonal grid. The surplus power generated in Kerala could be sold at a profit to the neighbouring States, especially Madras, which is not so fortunately placed as Kerala in respect of its hydel resources. Kerala would also stand to gain from this transfer of electrical energy since it can generate power at a much lower cost than its neighbouring States, and therefore, earn sizeable revenues from this source.

Total investment effort required for execution of the plans of development suggested in this report would be of the order of Rs. 1,000 crores over the ten-year period. The share of the State Government would be approximately Rs. 500 crores, the balance being left to the initiative of the Private Sector, and the investments through Central Government projects. Total investment would be distributed over the primary, secondary and tertiary sectors in the ratio of 20.8 per cent, 28.8 per cent and 50.4 per cent respectively.

371 464 The impact of the proposed developments on the unemployment situation is not likely to be unimpressive. It is estimated that of the 17.8 lakh jobs envisaged to be created over the decade, 1.8 to 2 lakh jobs would be in the primary sector, 7.8 lakhs in the industrial sector and the balance of 7.7 lakhs in the tertiary sector. It

would still leave a backlog of about 4.7 lakhs unemployed persons in 1970-71. 371
However, the proportion of unemployed persons to the total population would have 464
been reduced from 4.2 per cent to 2.3 per cent.

It may thus be seen that in spite of certain optimistic assumption regarding creation of employment opportunities and a reduction in the intensity of unemployment, the number of unemployed persons by 1970-71 would be large for a State like Kerala.
In the long run an effective solution to the over-population of Kerala can only be 161
provided by a reduction in the rate of population growth through intensification of 168
Family Planning Programmes and migration to other parts of India. The need for widespread use of family planning methods and measures to promote migration, is all the more urgent in a region like Kerala where population density is high, rate of growth of population is rapid, and an acute unemployment problem exists. More reliance on measures to create additional employment opportunities within the State is not enough.

This survey like other similar surveys was undertaken by a team of National 114
Council economists and technicians headed initially by Dr. B. Natarajan and later by myself with the assistance specially of Mr. A.K. Mathur and Mr. S.R. Bose both of whom spent considerable time in the State. At the specific request of the Government of Kerala, the Director-General directed the enquiry in all its stages and visited the State on a number of occasions and guided the team. The names of persons who participated in the survey are listed in appendix 1. To all of them, specially to Mr. Mathur on whom the task of drafting the preliminary report fell, I wish to
express my thanks. I would also like to acknowledge the help and cooperation 122
received from the Government and the officers of the Kerala Government, specially the Director of Industries in the various stages of the survey. Finally, to the Minister for Industry, Mr. K.A. Damodara Menon I am specially indebted for his continuous interest in the survey and for the support and encouragement he gave to our staff.

P.S. LOKANATHAN
*Director General*

NEW DELHI
*July 1962*

[P. xi]
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# Contents

000

| | | Page |
|---|---|---|
| | Preface | v |
| 1. | The Setting | 1 |
| 2. | Agriculture and Plantation Crops | 20 |
| 3. | Animal Husbandry | 56 |
| 4. | Forests | 67 |
| 5. | Fisheries | 82 |
| 6. | Minerals | 95 |
| 7. | Power | 110 |
| 8. | Transport | 124 |
| 9. | Structure and Growth of Industries | 139 |
| 10. | Future Possibilities of Industries | 163 |
| 11. | Manpower and Employment | 206 |
| 12. | Pattern of Growth | 227 |
| 13. | Financial Resources for Development | 243 |
| 14. | Summary of Conclusions and Recommendations | 252 |
| | Tables | 269 |
| | Appendices | 318 |
| | Index | 363 |

## List of Tables

000

Page

1. Comparative rainfall for different meteorological sub-divisions of India .. .. 269
2. Density of population in Kerala .. .. .. .. .. .. 270
3. Estimate of State income of Kerala (1955-56) .. .. .. .. .. "
4. Sectoral employment and labour productivity in Kerala (1955-56) .. .. .. 271
5. Consumer expenditure in rupees per person by items of consumption for period of 30 days in rural areas .. .. .. .. .. .. .. .. 272
6. Valuation of foreign exports from the ports of Cochin, Alleppey and Calicut .. .. 273
7. Cumulative percentage distribution of number of holdings and land area of holdings in Travancore-Cochin area and the Malabar district .. .. .. .. .. "
8. Land utilization pattern in Kerala .. .. .. .. .. .. 274
9. Value yielded per acre .. .. .. .. .. .. .. 275
10. Area and production of principal crops in Kerala (1950-51 and 1958-59) .. .. 276
11. Per acre yields of principal crops in Kerala .. .. .. .. .. 277
12. Area irrigated according to sources .. .. .. .. .. .. 278
13. Area and production of rubber in Kerala .. .. .. .. .. "
14. The number of registered coffee estates according to size and area as on the 31st July, 1958 .. 279
15. List of major irrigation projects for the Third and the Fourth Plans—phasing of expenditure proposed for irrigation Plan .. .. .. .. .. .. 280
16. Average annual milk yield per animal (1956) .. .. .. .. .. 282
17. Gross value of output from animal husbandry in Kerala .. .. .. .. 283
18. Livestock population of Kerala—major categories, 1951 and 1956 .. .. .. "
19. Number of cows and she-buffaloes in milk per thousand population in Kerala and other Indian States .. .. .. .. .. .. .. .. 284
20. Cattle and buffaloes in Kerala (Categories) 1956 .. .. .. .. 285
21. Number of veterinary institutions in Kerala State (1958-59) .. .. .. "
22. Location, capacity and investment of the proposed milk-processing centres .. .. 286
23. Districtwise area under forests .. .. .. .. .. .. "
24. Plan provisions and progress on various forest schemes .. .. .. .. 287
25. Statewise landings of marine fish in India .. .. .. .. .. 288
26. Statewise fishing effort applied in marine fisheries of India .. .. .. .. "
27. Proposed investment and increase in fish output (1961–71) .. .. .. .. 289

Page 000

28. Mineral production—Kerala .. .. .. .. .. .. 289
29. Exports of ilmenite from India .. .. .. .. .. .. 290
30. Estimated consumption of $TiO_2$ by 1965-66 .. .. .. .. .. ,,
31. Tile-clay production (Districtwise) .. .. .. .. .. .. 291
32. Proposed growth of output, labour, investment and returns for mining (inclusive of benefication) from 1961-71 .. .. .. .. .. .. .. ,,
33. Structure of generation and utilization of electrical energy in Kerala, 1954 to 1958-59 .. 292
34. Distribution of electricity in Kerala .. .. .. .. .. .. 293
35. Annual energy capacity of each station in an average year, and the estimated cost of generation ,,
36. Consumption of energy by Kerala Electricity Board and revenue (1957-58) .. .. 299
37. Line capacity in railway sections in Kerala State .. .. .. .. 294
38. Road mileage in Kerala according to different categories of road .. .. .. 295
39. Road mileage in the districts of Kerala .. .. .. .. .. ,,
40. Targets and achievements in road and bridge construction and improvement in the Second Plan ,,
41. Estimate of additional traffic (originating and terminating) in Kerala in 1970-71 .. .. 296
42. Additional traffic anticipated in the inland waterways of Kerala in 1970-71 .. .. ,,
43. List of roads proposed for construction and improvements in 1961-71 .. .. .. 297
44. Proposals for investment on transport in Kerala in 1961-71 (Rupees in crores) .. .. 298
45. Resource-based classification of factories and their present employment .. .. 299
46. Average size of factories .. .. .. .. .. .. .. ,,
47. Growth in the number of factories and the average number of persons employed per day in Kerala .. .. .. .. .. .. .. .. 300
48. Number of disputes, workers involved, man-days severity rates, by States .. .. 301
49. Growth of income originating in the secondary sector (1961-71) .. .. .. 302
50. Outline of the requirements of large and medium industries .. .. .. .. ,,
51. New industries and expansions recommended in this report .. .. .. .. 303
52. Investment estimates for the secondary sector (1961-71) .. .. .. .. 305
53. Availability and Utilisation of cashewnuts .. .. .. .. .. 306
54. Export of tiles from Beypore (Kozhikode) port .. .. .. .. .. 307
55. Fish-based and ancillary industries .. .. .. .. .. .. 308
56. Comparative age distribution of population .. .. .. .. .. 309
57. Participation rates—rural and urban; sex and agricultural and non-agricultural .. .. ,,
58. Density of population (Kerala State) .. .. .. .. .. .. 310
59. Occupational break-up of working force (1951) .. .. .. .. .. ,,

000

| | | Page |
|---|---|---|
| 60. | Unemployment position in Kerala | 311 |
| 61. | Comparative sectoral distribution of working force | „ |
| 62. | Emigration from and immigration to other parts of India | 312 |
| 63. | Investment during the coming decade (1960-61 to 1970-71) | „ |
| 64. | Estimates of employment, 1956-71 | 313 |
| 65. | Relative increased to major components of revenue of Kerala | „ |
| 66. | Relative increases in components of tax revenue of Kerala (1957-61) | 314 |
| 67. | Development and non-development expenditure by the Government of Kerala | 315 |
| 68. | Public loans and small savings during the Second Plan | 316 |
| 69. | A tentative estimate of resources | „ |

## List of Appendices

| | | Page |
|---|---|---|
| 1. | Composition of the survey team | 318 |
| 2. | A note on the State income estimates of Kerala (1955-56) | 319 |
| 3. | A note on the sectoral estimates of working force for 1955-56 | 326 |
| 4. | Calculation of income contributed by forestry | 328 |
| 5. | Lists of trees and other produce found in Kerala along with their present uses | 329 |
| 6. | Statement showing outturn of minor forest products during 1958-59 | 332 |
| 7. | Calculation of factory employment | 334 |
| 8. | Raw materials supplied by the Government to industries (October 1959 to March 1960) | 336 |
| 9. | Items required for ship-building | 338 |
| 10. | List of small scale industries | 340 |
| 11. | Summary statement of possible large scale and medium scale industries (1960-61 to 1970-71) | 346 |
| 12. | Methods and basis of projections—tax and non-tax revenue | 360 |

## List of Maps

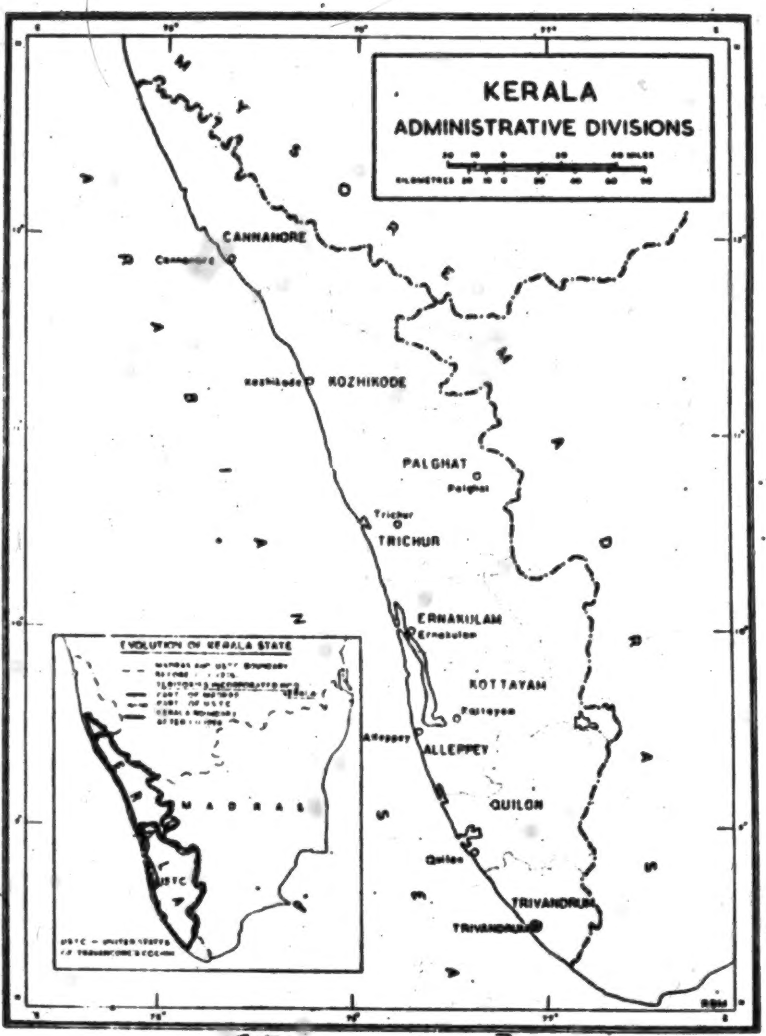
Page
1. Administrative divisions .. .. .. .. .. .. Frontispiece
2. Normal annual rainfall .. .. .. .. .. .. .. 3
3. Physiography .. .. .. .. .. .. .. 5
4. Changing pattern of density of population, 1951-1961 .. .. .. .. 7
5. Land utilisation .. .. .. .. .. .. .. .. 23
6. Cropping pattern (food crops), 1958-59 .. .. .. .. .. .. 26
7. Cropping pattern (commercial crops) 1958-59 .. .. .. .. .. 27
8. Forest areas .. .. .. .. .. .. .. .. 66
9. Geology & minerals .. .. .. .. .. .. .. 96
10. Hydro electric power schemes (existing & potential) 1960 .. .. .. .. 111
11. Density of goods traffic on railways, 1957-58 .. .. .. .. .. 126
12. Road map .. .. .. .. .. .. .. .. 129
13. Location of industries—agro-based (including textile), 1956 .. .. .. .. 147
14. Development possibilities of large and medium scale industries—1961-71 .. .. .. 149
15. Location of industries (forest-based, mineral-based, chemical & engineering industries) .. 164

## List of Charts

1. Changing pattern of land utilisation, 1951-1956 .. .. .. .. .. 24
2. Pattern of economic growth in Kerala, 1961-71 .. .. .. .. .. 229

MAP 1

102
103
131
133
634


KERALA
ADMINISTRATIVE DIVISIONS
MILES
KILOMETRES
MYSORE
MADRAS
ARABIAN SEA
CANNANORE
Cannanore
KOZHIKODE
Kozhikode
PALGHAT
Palghat
Trichur
TRICHUR
ERNAKULAM
Ernakulam
KOTTAYAM
Kottayam
Alleppey
ALLEPPEY
QUILON
Quilon
TRIVANDRUM
TRIVANDRUM
EVOLUTION OF KERALA STATE
MADRAS
T.T.C.
RBM

[Frontis Piece]
[facing p.1]

# Chapter 1

# The Setting

KERALA IS THE smallest State in the whole of India.[1] It is a narrow strip of 131
land along the western coast of India. It has an area of 14,992 square miles[2] and
the coastal line is nearly 360 miles. The breadth of the State varies from 20 to 75
miles, as one moves from the extreme north to the middle. Its boundaries touch the
State of Mysore in the north and that of erstwhile Madras in the east and south-east.
It lies between 8°15′ and 12°45′N latitude and 74°50′ and 77°30′E longitude.

1.2 Kerala was created in 1956 at the time of the reorganization of the State 175
through the integration of the erstwhile State of Travancore-Cochin and the Malabar 635
district and the Kasargod taluk in South Kanara district of the erstwhile Madras State. 634
At the same time Travancore-Cochin lost Kanyakumari, part of the Trivandrum district
and Shencottah, part of the Quilon district, to Madras State. However, the net
area of the State increased by about two-thirds after the reorganization of the State.
Prior to the formation of Kerala as a separate State, Travancore-Cochin was administratively
divided into four districts, while Malabar was a single district. At the
time of integration, Malabar was broken up into three districts. Subsequently,
during 1957 two new districts, viz., Alleppey and Ernakulam were carved out of the
territory belonging to Trichur, Kottayam and Quilon. The State, therefore, now
comprises nine districts. The total length of the State from its northern extremity [131]
to the southern tip is about 360 miles. But its width is nowhere more than 75 miles.

## PHYSICAL FEATURES

1.3 The State territory may be broadly classified into three natural sub-divisions, 133
the highland, the midland and the lowland. Western Ghats which range along the
eastern border of the State form the highland. This is mostly a mountainous and
rocky terrain ranging in height from 3,000 ft. to 8,000 ft. Anamudi, the highest
peak of the Western Ghats (8,837 ft.) is located in the Kottayam district. The [137]
highland is thickly forested in its upper ranges, while in the lower ranges the forests
are interspersed with plantations.

1.4 On the western fringe of the State are the lowlands which stretch along the
coastal plain. Coconut palms, which cover most of this area, lend a richness to the [134]
landscape of the region. The soil in this plain is sandy. Coir-making and fishing
are the two main occupations. Sandwiched between the lowland and the highland [433]

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[1] Excluding the Union Territories.

[2] *Statistical Outline of Kerala State*, Department of Statistics, Government of Kerala. [113]

133 is the undulating terrain of the midland with laterite soil. This middle region is
[24] rich in agricultural produce ; paddy, tapioca, spices and cashewnut being some of the main crops of this area.

*Climate and Rainfall*

132 1.5 The same diversity which characterizes the physical features of the State, also occurs in case of the climatic conditions. Whereas the highland has a cool and bracing climate throughout the year, the plains are hot and humid. However, the range of variation in temperature is very narrow, the normal limits being 80°–90°F.

1.6 The average level of annual rainfall is quite high being in the neighbourhood of 96 inches. In fact only Konkan and Malabar–South Konkan region with 109 inches and 121 inches surpass Kerala in the annual volume of rainfall. Since Kerala is fortunate in getting precipitation both from the south-west and the north-east monsoons, the rainfall is fairly spread out over the year. January to April are practically the only months which are completely dry. Moreover, annual variations in rainfall are also comparatively low. The co-efficient of mean deviation of annual rainfall is only 6.5 which is lower than that of all the other States, except Assam (Table 1).[1]* Draughts are, naturally, rare.

## ECONOMIC CONSEQUENCES OF THE PHYSICAL CHARACTERISTICS

133 1.7 The influence of geological formation and geographical features on the economic structure and the growth possibilities varies from region to region. However, some of these stand out distinctly in the case of Kerala. The high mountainous wall of the Western Ghats and its close proximity to the sea is responsile for the heavy and regular rainfall which this State receives. The high characteristic rainfall, in turn, is responsible for a number of features of this State. The large number of high value yielding plantation crops and the rich forest growth owe their existence to the rainfall and the suitable climatic conditions found in the Western Ghats. The abundant rainfall has also provided Kerala with a large number of rivers. These are the storehouse of water resources—one of the chief assets of Kerala. There are 44 rivers in addition to a much larger number of small rivulets and streams. Forty-one of these rivers are west flowing and yield a total run off of 2,500 T.M.C. ft.[2] This is as high as 5 per cent of India's total water potential, whereas the total area of Kerala is only about 1.2 per cent of the area of India.

1.8 Since the Western Ghats are in close proximity of the sea coast, most of the rivers are also very short, the average length being only 40 miles. Only four rivers, viz., Beypore, Bharatapuzha, Periyar and Pamba are more than 100 miles in length. Although the rivers are small, they carry sizable flows and these provide the State with rich irrigation potential.

[text continues on p. 4]

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[1] Table 1 refers to the States as they existed before the reorganization. The conclusions, strictly speaking, refer to only Travancore-Cochin. However, they are broadly true of Kerala as a whole also.

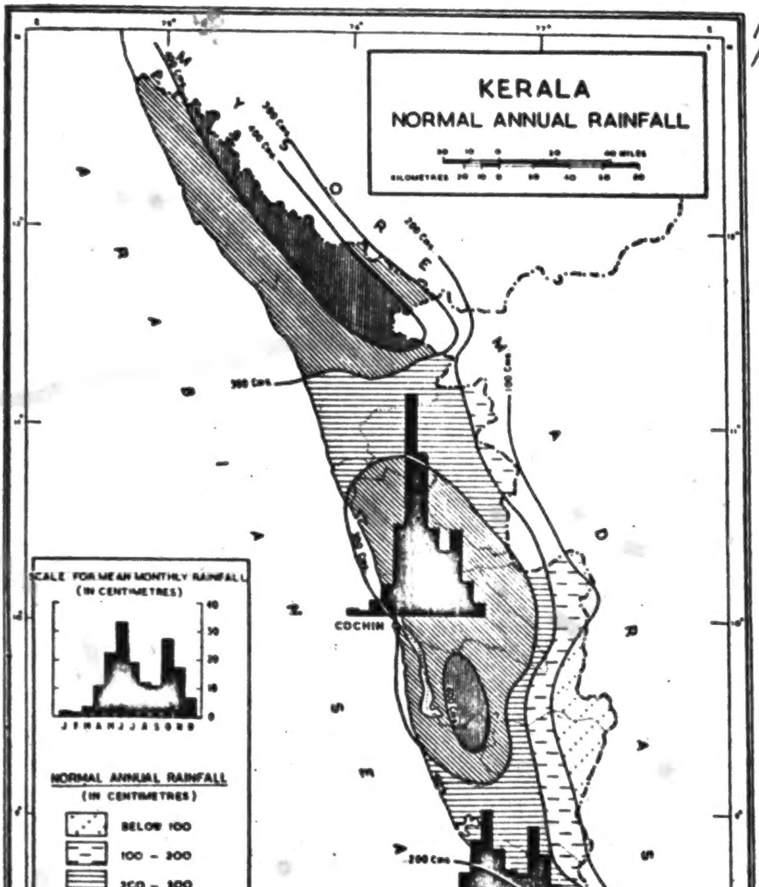
[2] T.M.C. ft.—Thousand Million Cubic Feet.

[113] SOURCE: *Water Resources of Kerala*, PWD, Government of Kerala.

*[Table 1, appearing on p. 269 of the text, has not been processed -- Analyst]

[P. 3]

MAP 2


KERALA
NORMAL ANNUAL RAINFALL
MILES
KILOMETRES
ARABIAN SEA
MYSORE
MADRAS
300 Cms.
400 Cms.
200 Cms.
100 Cms.
COCHIN
TRIVANDRUM
SCALE FOR MEAN MONTHLY RAINFALL (IN CENTIMETRES)
J F M A M J J A S O N D
0
10
20
30
40
NORMAL ANNUAL RAINFALL (IN CENTIMETRES)
BELOW 100
100 - 200
200 - 300
300 - 400
ABOVE 400
RBM

133 1.9 The distance within which these rivers descend to the sea level being very 379 short, there are generally a large number of steep falls or a series of cascades in their courses. These provide a rich potential for generation of hydro-electric power, which can be generated at a low cost (1.7 nP per kWh on an average). This low cost power potential is an important asset of Kerala from the point of view of the future programmes of industrialization.

133 1.10 Some other implications of topographical features are not so obvious. For example, the lakes, the lagoons and the backwaters fringed with coconut palms, no doubt, impart to Kerala its characteristic scenic beauty and provide one of the chief tourist attractions. Their importance, however, goes much beyond the purely 133 aesthetic aspect. In fact, the backwaters—especially in the Travancore-Cochin region 288 —are indirectly responsible for providing the means of livelihood to a vast section of the population. Coir spinning, the chief industry of Kerala, is located in this State 182 primarily because of the natural retting facilities provided by the backwaters. The availability of these facilities is unique in the case of Kerala. In almost all other coconut-growing areas of India, the coconut husks go waste because of the absence [464] of natural retting facilities. Since coir industry provides an occupation to 4 to 5 lakh persons (about 10% of the total working force and 40% of industrial working force), one can well imagine what the unemployment situation in Kerala 133 would have been in the absence of the backwater facilities. The backwaters have 487 also facilitated the development of a wide network of inland waterways all along the [509] coastline. Apart from employing a large number of persons in towing or rowing the boats, the inland waterways provide inexpensive modes of transporting the agricultural produce and light industrial goods manufactured in the coastal area.

3 1.11 Up till now only some of the favourable consequences of physical features have been pointed out. The sloping terrain and preponderance of backwaters in the coastal area also possess a negative aspect. The heavy downpour is gradually leaching off the mineral content of the soils, thus rendering them generally poor in their fertility status. One of its ultimate consequences is the fact that livestock feed [234] available in Kerala is deficient in mineral content and this in turn reduces the yield of milk of the livestock. The heavy precipitation of rain also creates a serious flood control problem in Kerala.

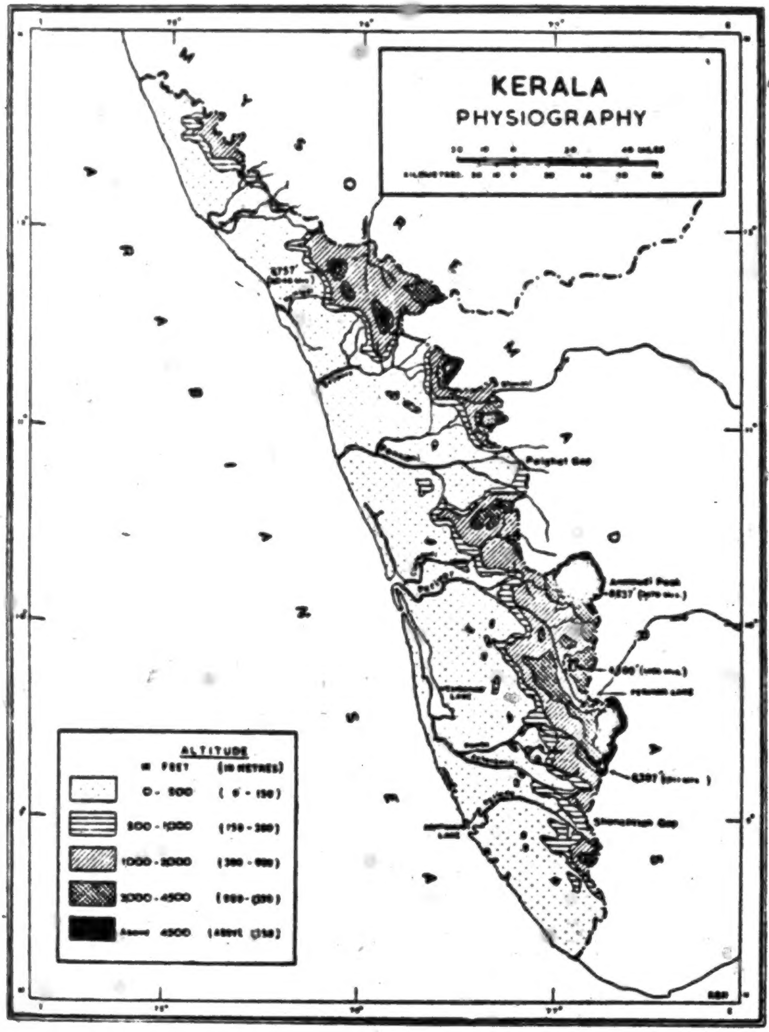
133 1.12 The backwaters raise other problems as well. During the dry summer months saline water from these flows into the lower reaches of the rivers, many of which fall into the backwaters. This has an adverse effect on cultivation and the supply of drinking water in the coastal areas. Coastal areas are, therefore, beset with the problem of salinity control. The chain of consequences does not stop here. [312] Recently implementation of one of the important salinity control measures in Kerala, viz., the Thanneermukkom bund across the Vembanad lake has created a new problem in its wake. The accretion of limeshell deposits, an important raw material found in the lake, depends on the high salinity of the lake water. Since, after putting up of the barrage salinity of water will get reduced, it will have adverse [339] repercussions on the long run supply position of the limeshells. This, in turn, jeopardizes the long run prospects of the cement industry in the State which is based on the limeshells.

[text continues on p. 6]

[P. 5]

102
103
133

MAP 3


KERALA
PHYSIOGRAPHY
ALTITUDE
IN FEET
(IN METRES)
0 - 500
500 - 1000
1000 - 2000
2000 - 4500
Above 4500
MYSORE
MADRAS
ARABIAN SEA
Palghat Gap
Anaimudi Peak
8837'
Shencottah Gap

182 1.13 These, broadly, are the inter-relationship between physical features and economic aspects of the State, and largely determine the nature and structure of the Kerala economy discussed below.

*Density of Population*

161 [464] 1.14 In the ultimate analysis, the basic problem of Kerala, viz., an inordinately large section of the population being without any gainful work, is brought about by the very high density of population in the State. With an area only 1.2 per cent of the whole of India, Kerala has to support 3.8 per cent (16.8 million) of the total population of India. The density of population in Kerala (1,125 persons per sq. mile) is naturally over three times the all-India average (384 persons per sq. mile).

1.15 The population, however, is not evenly spread out over the whole of the State, but shows considerable variations from district to district (Table 2).‡ The highland, being mostly covered with forests, is sparsely populated. The average density here is only about 150 persons per square mile. On the other hand, the lowlands bear the severest burden of population. With only about 18 per cent of the State area, they support over 40 per cent of the population. On the other extreme is the coastal strip where the average density is over 2,500 persons per square mile. In certain pockets it even shoots up to 7,000 persons per square mile. The midland, though thickly populated, is not as congested as the area lying in the immediate vicinity of the sea coast.

*Growth of Population*

1.16 Not only is the density of population high in Kerala, but its rate of growth has also been fairly high. The following table gives the rate of growth of population over the last half century both for India as well as for Kerala.

DECENNIAL PERCENTAGE VARIATION IN POPULATION

| *Year* | *India* | *Kerala* |
|---|---|---|
| 1901-11 | 5.69 | 1.75 |
| 1911-21 | —0.31 | 9.16 |
| 1921-31 | 11.00 | 21.85 |
| 1931-41 | 14.23 | 16.04 |
| 1941-51 | 13.34 | 22.82 |
| 1951-61 | 21.49 | 24.55 |

SOURCE: 1961 Census of Population Provisional Figures.

[165] [163] 1.17 As can be seen, the population has grown much faster in Kerala than in the country as a whole during the last six decades. The basic reason for a faster rate of growth of population in Kerala is a comparatively low death rate while the birth rate is only slightly less than the all-India one. The comparative position of birth and death rates in India and Kerala is given in the following table.

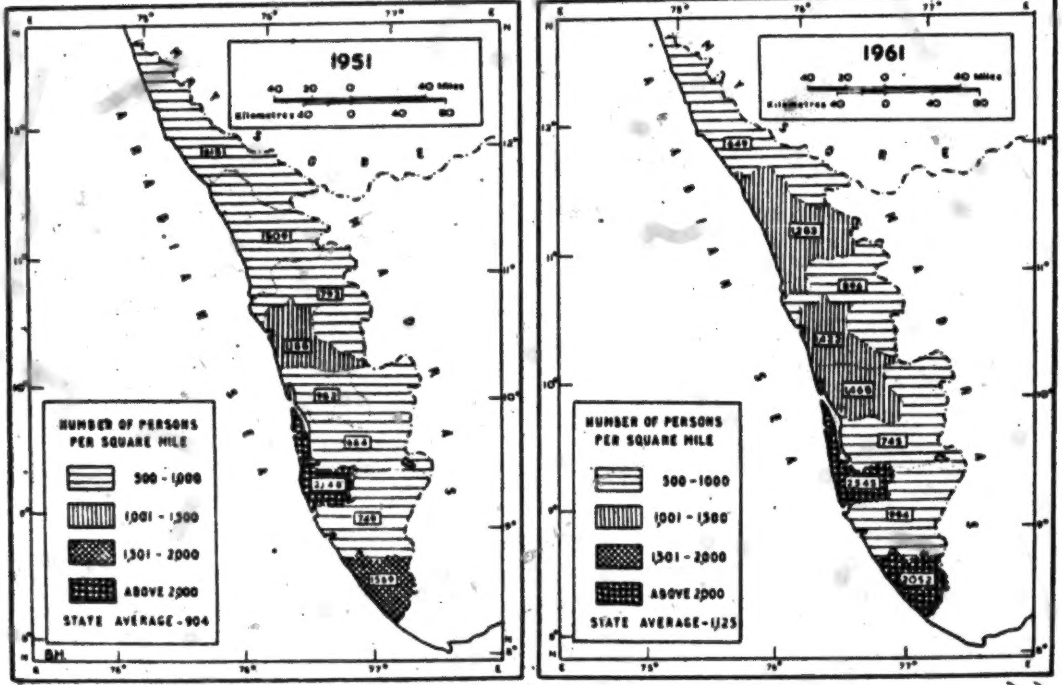
‡ [see p. 270, category 116 -- Analyst]

[text continues on p. 8]

[P.7]

# KERALA

## CHANGING PATTERN OF DENSITY OF POPULATION, 1951-1961


1951
40 20 0 40 Miles
Kilometres 40 0 40 80
NUMBER OF PERSONS PER SQUARE MILE
500 - 1,000
1,001 - 1,500
1,301 - 2,000
ABOVE 2,000
STATE AVERAGE - 904
793
2148
749
1569
B.M.
1961
40 20 0 40 Miles
Kilometres 40 0 40 80
NUMBER OF PERSONS PER SQUARE MILE
500 - 1000
1,001 - 1,500
1,301 - 2,000
ABOVE 2,000
STATE AVERAGE - 1,125
745
2545
2052
75°
76°
77°
12°
11°
10°
9°
8°

102/161

163
165

### COMPARATIVE POSITION OF BIRTH AND DEATH RATES

| | | *Average birth rate per year per 1,000 persons* | *Average death rate per year per 1,000 persons* |
|---|---|---|---|
| 1941-51 | All-India | 41.3 | 24.9 |
| | Kerala | 38.2 | 19.9 |
| 1951-56 | All-India | 41 | 25 |
| | Kerala | 38 | 17 |

SOURCE: NCEAR calculations based on Census data and corrected birth and death registration data.

1.18 In fact comparative data for the different States shows that the death rate in Kerala is the lowest in the whole of India. The death rate is lowest in Kerala, presumably because of the generally high standard of hygiene of the people of this [244] area. The erstwhile States of Travancore and Cochin had long followed a progressive policy in the field of providing public amenities such as medical facilities, sanitation, etc. Since the standards of literacy as well as the average level of intelligence are fairly high in Kerala, with a more vigorous family planning programme it should be possible to bring down the birth rate within a shorter span of time than in many other parts of India.

*Rural-Urban Breakdown*

162 1.19 Only 13.5 per cent of Kerala's population lived in urban areas against 17.38 per cent of all-India, according to the Census of 1951. This difference seems to have narrowed down during the last decade, the proportion of urban population in Kerala having risen to 15.03 per cent by 1961, while it rose to only 17.84 per cent for the whole of India.[1]

361 1.20 The villages in Kerala are unique in size. According to the Census of 1951 as high as 13 per cent of villages had a population exceeding 5,000 persons against only 0.38 per cent of such villages in the whole of India. However, there are some redeeming features which prevent the countryside from presenting an appearance of over-congestion. The villages in Kerala are of a different type than is usual in the rest of India. The homesteads are generally not clustered together but are dotted almost all over the countryside. This spread out of population keeps living conditions healthy and clean in the rural areas.

## STATE INCOME, OCCUPATIONAL DISTRIBUTION AND LABOUR PRODUCTIVITY

437 1.21 The State income of Kerala in 1955-56 has been estimated at Rs. 351.6 crores[2] at the current prices (Table 3). This is roughly 3.4 per cent of the National Income of India (Rs. 9,980 crores) for the same year. For an area which is only

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[1] It may be noted that this is only a broad conclusion as the definitions of urban areas in Census of 1951 and of 1961 are not identical.

[2] *See* Appendix 2 for details.

1.2 per cent of the total area of India, this contribution is quite significant. Yet 434
the per capita income of Kerala in 1955-56 (Rs. 234.4) was lower than the all-India [171]
average (Rs. 261) by about Rs. 27, that is, 10.3 per cent.

1.22 The distribution of output and employment between primary, secondary 433*
and tertiary activities gives a broad indication of the stage of development an 434
economy has attained. As a general rule, the more advanced the stage of economic 464
development, the higher the proportion of income and employment originating in 171
the secondary and tertiary activities. In Kerala the sectoral distribution of output
and employment presents somewhat of a contrasting picture (Tables 3 and 4).[2] In
terms of employment, the proportion of working force engaged in agriculture and
allied occupations (55%) is much smaller than the corresponding all-India proportion (71.8%). This would seem to indicate that Kerala has perhaps reached a
level of development somewhat comparable to that of a country like Japan. But
the picture presented is quite different when one looks at the proportion of income
contributed by the various sectors. The major share (49.1%) of output still
originates in the primary sector (all-India: 45.4%). The secondary and tertiary
sectors taken together contribute 50.9 per cent of the output against 54.6 per cent
in the case of all-India.

1.23 Thus, while the sectoral distribution of population seems indicative of a 433*
diversified structure of the economy, the sectoral distribution of income does not. 464
Two factors seem to provide a plausible explanation for this contrast. In view of the [434]
high density of population, the possibilities of providing gainful employment in the
agricultural sector are naturally limited. Super-imposed upon this is the fact that
as a result of the predominence of perennial crops, especially the coconuts, in the
agricultural sector, the cropping pattern in Kerala is comparatively less labour-intensive. As a result of the operation of these forces, a large section of the population
appears to have been forced to turn to some sort of non-agricultural activity or the
other. But this seems to be of a "make-work" character. The technology of the
secondary sector is traditional and its productivity is appallingly low.

1.24 In fact, productivity in Kerala's secondary sector is even lower than in the 433*
primary sector. This reversed position of Kerala only points to one of the strange
paradoxes that occur in an under-developed economy. Ultimately, it is not so much
the sectoral distribution of working force as the sectoral levels of productivity that
are the determinants of growth. Productivity, in turn, is a function of the level of
technology. Table 4 shows that the net output per worker in the secondary and [171]
tertiary sectors is lower than the average for all-India. As may be observed,
low productivity is especially marked in the secondary sector which mostly covers
the industries (Kerala—Rs. 539; all-India—Rs. 1,294).

### *Agriculture and Plantations*

1.25 On the other hand, the primary sector in Kerala is comparatively better 433*
developed. This is a distinct feature of the State economy. Primary sector 241
comprises agriculture, plantations, animal husbandry, forestry and fisheries. As may
be seen from Table 4, labour productivity in the primary sector of Kerala is roughly

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[2] [see pp. 270-271, category 116 -- Analyst]

*433 241 50 per cent higher than at the all-India level. Agricultural crops and the plantations, which form the main component of the primary sector, are largely produced for the market and are the basic factors responsible for imparting a high level of productivity to this sector.

241 1.26 Agriculture in the State is characterized by a high value yielding cropping pattern, good physical yields, a high intensity of cropping and superior cultivation [171] techniques. During 1956-57 the intensity of cropping[1] was 119 per cent (all-India—113%). However, if field crops alone are taken into account, the cropping intensity shoots up to 150 per cent. It is the latter percentage which is the more relevant one, since the area covered by the perennial crops is irrelevant from the point of [171] view of double or triple cropping. All these factors combine to make the agricultural sector of Kerala highly productive, the average level of agricultural output per net cultivated acre in Kerala being about Rs. 360 against Rs. 125 for the whole of India.

245 249 *[433] 1.27 Kerala owes the superiority of its cropping pattern to the large number of high value yielding plantation crops grown in the State. Coconuts, the most important among these, occupy about 20 per cent of the gross cropped area and yield Rs. 450 per acre on an average. Other cash crops in the order of their importance in terms of area covered are pepper, rubber, arecanut, tea, cashewnut, cardamom, and coffee. Taken as a whole, they cover approximately 40 per cent of the gross cropped area.

*433 245 249 [288] 1.28 Apart from the high productivity aspect of the plantation crops, they are of significance to the economy from two other angles. First, these crops provide the raw material for some of the key industries of the State. Coir making, the most important industry of the State, utilizes the outer husks of the coconuts. Similarly, cashewnut industry, the second most important industry of Kerala, also draws its raw material from the agricultural sector. Besides these, Kerala holds almost a complete all-India monopoly in the production of rubber, which is another important [439] industrial raw material. Secondly, plantation crops derive their prominence from the fact that a large number of crops grown in Kerala find a good export market and are, therefore, very good foreign exchange earners.

*433 439 438 1.29 One other feature of the Kerala economy which owes its origin to the agricultural sector may also be pointed out. Unlike the rest of India, where barter trade is still prevalent on a significant scale in the rural areas, Kerala economy is highly monetized. The large number of cash crops grown in the State are all brought to the market for sale. Secondly, since a high percentage of food requirements are obtained from the other parts of India, they are again channelled through the market. A high degree of commercialization of Kerala economy is one of the factors responsible for absorption of a large section of the population in the tertiary sector.

241 423 1.30 Otherwise agriculture in Kerala carries with it all the disquieting features common to Indian agriculture. The pressure of population on land is even severer here. The average size of holdings in Kerala has dwindled down to 1.5 acres

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[1] Intensity of cropping is the ratio between gross cropped area and net sown area. It gives the degree to which a given piece of land is utilized.

against the all-India average of 7.5 acres; and over 60 per cent of the landholdings 241 423
in Travancore-Cochin area are less than one acre in size.

1.31 The high pressure of population also reveals itself in an urge to push along 311
the margin of cultivable area as far as possible. This is shown by the fact that the proportion of net sown area (45.25 lakh acres) to total area of the State was as high as 47.16 per cent against 39 per cent for the whole of India in 1956. The higher proportion assumes even a greater significance in view of the fact that forests cover over 25 per cent of the total area of Kerala (all-India—18%).

1.32 The agricultural labourers form a very high proportion of the agricultural 162
population (Kerala 39%: India 17.5%), and the extent of under-employment 464
among them is also one of the highest in India. The number of days of employment per agricultural labourer in Kerala was only 170 days per year[1], the lowest in the whole of India.

1.33 A deterioration in the position of the agricultural labourers is shown by the 434
decline in the average annual income of agricultural labour households between 178
1951 and 1957. As can be seen from the table below, the average annual income of an agricultural labourer's household in Kerala declined from Rs. 486 in 1951 to Rs. 437 in 1956. This is a much steeper decline than observed in the case of the whole of India, presumably due to a higher rate of growth of population in Kerala than in India.

AVERAGE ANNUAL INCOME OF AGRICULTURAL LABOUR HOUSEHOLDS [171]

| | *Kerala* (Rs.) | *India* (Rs.) |
|---|---|---|
| 1950-51 | 486 | 447 |
| 1956-57 | 437 | 437 |

SOURCE: *Second Report of the Agricultural Labour Enquiry Committee.* [113]

*Consumption Pattern*

1.34 The level of consumption expenditure per head is a good indicator of the 511
standard of living prevailing in any region. Table 5[3] gives a comparative picture 171
of the pattern of consumption expenditure for the rural areas of Travancore-Cochin[2] and India. As may be seen, the average monthly consumption expenditure in Kerala (Rs. 18.64) is lower than that in all-India (Rs. 21.44), indicating a somewhat lower standard of living in the State.

1.35 The break-up of total expenditure into different items of consumption
reveals some interesting points. The expenditure on foodgrains, milk and milk 511
products is not only absolutely lower in Kerala but even as a proportion of total 262
expenditure, it is considerably below the all-India average. On the other hand, [171]
meat, egg, fish and 'other food' absorb quite a high proportion of consumption
expenditure in Kerala. These differences reflect the relative scarcity of foodgrains [113]

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[1] *Report of the Agricultural Labour Enquiry Committee.*

[2] The data is compared for Travancore-Cochin and India (1952) because figures for Kerala State are not available. However, the conclusions are likely to be broadly true of Kerala also.

[3] [see p 272, category 116 -- Analyst]

511 and milk products in the State as a result of which people have to lean more heavily
[262] on fish and tapioca.

1.36 Among the items of non-food expenditure the significant point is the higher
[296] percentage of expenditure devoted to clothing. The neatness and cleanliness of
dress worn by the people of Kerala is evident even to a casual visitor to the State.

*The Food Gap*

*433 1.37 The superior cropping pattern has also brought with it a huge food deficit.
241 In this, Kerala leads all the other States. The current production of foodgrains is
262 estimated at 9.6 lakh tons, whereas requirements on the basis of a norm of 17 ozs.
per day would come to about 24 lakh tons, leaving a gap of nearly 14.6 lakh tons. The width of this gap is only partially closed by the consumption of tapioca as part of the diet by poorer sections of the people, although it does form an important second line of defence in the lean years as in 1940's when there was a severe food shortage.

*433 1.38 Wide as the food gap in Kerala is, it has often led to the formulation of solutions which, if given effect to, would be retarding the operation of inherent growth factors in the Kerala economy. Every economy may present some "growth leaders", and development consists in stimulating and invigorating them. The climate and physical formation of Kerala favour the growth of a large number of valuable cash crops. It is this sector to which maximum attention should be devoted. Kerala is better suited to serve the role of an exchange economy which relies for its food requirements on the other parts of India and in return contributes to the economic development of the country by earning valuable foreign exchange through the export of raw and semi-processed commodities.

231 *Other Primary Activities*

1.39 Of the other three primary activities, viz., animal husbandry, forestry and
[234] fisheries, the former, that is, livestock is rather poorly developed. Due to the poor
breed, and the natural deficiency in the livestock feed, the cattle is of poor quality
235 with milk yields much lower than the all-India level. The only exception to
this is poultry. Kerala can claim to have the best developed commercial poultry
[439] in India, the eggs produced in Kerala going even as far north as Punjab. However,
in view of under-feeding and the poor conditions under which the birds are reared, there is still a lot of unexploited potential in poultry development.

313 1.40 Forestry and fishery are the two other sectors which hold an important place in the economy of Kerala. The forests in the State are rich in some of the valuable species like teak and rosewood. As a result of forest management on scientific lines and the high quality of forest growth, their yield per acre in Kerala during 1955-56 was as high as Rs. 18 against the all-India average of Rs. 5.6. This sector is crucial as a source of supply of industrial raw materials.

226 1.41 Kerala ranks foremost among the fish-producing States of India. In 1957 total fish landings in Kerala were 3.41 lakh tons. With only 10 per cent of the all-

India coastline, 30 per cent of the country's fish production came from the coast of 226
Kerala. There is, however, still ample scope for increasing the output of fish. Only 226
the fringe of the potential for off-shore fishing has been tapped up till now. Similarly, 433*
it is believed that the output of fish can also be increased considerably from the coastal
fisheries without subjecting the fishing grounds to undue pressure. Introduction of
mechanized fishing and better fishing gear can add considerably to fish production.
However, as it is, the fishermen are the most depressed class of persons in the economy, [511]
and unemployment is at its maximum among them. [464]

1.42 Development of fisheries is of particular importance in case of Kerala in 433*
view of the large food deficit of the State. The requirements of rice for a balanced 262
diet could be considerably reduced if it is adequately supplemented by tapioca and 226
fish. Tapioca by itself is not an adequate substitute for rice requirements since it
lacks in proteins. However, its food value can be considerably enhanced if it is
combined with a sufficient quantity of fish.

*Secondary Sector* 317

1.43 The secondary sector covers mining and industry. Mining activity is
comparatively limited in Kerala in view of the meagre occurrence of minerals.
During 1955-56 mining contributed only 0.6 per cent of the State Income (all-India
1%). The chief mineral asset of Kerala is the beach sand. Ilmenite is the most 135
important variety of the beach sands. Besides some fine quality china-clay, of which
there are good reserves, other items of mineral wealth of Kerala are not of any
particular importance.

1.44 The industries of Kerala, both the factory[1] and the non-factory type, are 433*
marked by a low level of productivity as shown by Table 4. The main reason
for this is the backwardness of technology employed as would be true of other parts
of India as well. While this may not apply to the modern industries run on a large
scale basis, in some of which indeed the State has been a pioneer, the overall picture
of industry presented as a whole is, nevertheless, one of poor technological level.
Further, during 1955-56, the organized factory industries employed 17.5 per cent 433*
of the working force in the secondary sector (9.7 lakhs) as against 21.8 per cent in 464
India. Moreover, in both the factory and the non-factory categories, the major
share of employment opportunities is monopolized by a few industries which can
by no means claim to be in the forefront of modern industries.

1.45 In the non-factory sector, out of a total working force of 7.8 lakh persons, 288
almost 50 per cent of the workers are employed in the coir industry, the foremost 464
industry of Kerala. As in most cottage industries, the maximum degree of mechani- 438
zation in coir industry never goes beyond a spinning wheel. In Malabar, even that is
missing, since spinning operations are mostly carried on with hand. Similarly in [258]
the factory sector, the three major industries, viz., cashewnut, textile and coir factories
which account for 64 per cent of factory employment, are entirely unmechanized.

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[1] Factory type of units are defined as those falling within the coverage of Section 2 in (*i*) and (*ii*) of the Factories Act, 1948. These include all those factories employing more than 20 workers as well as those employing between 10 to 20 workers, if using power.

258 464 Cashewnut industry, by the very nature of the process involved, does not require much of capital equipment. Although the average size of cashewnut factories is about 400 workers per unit, capital requirements in the industry hardly exceed 288 Rs. 200 per worker. Even the coir and cotton textile factories in Kerala use only the handlooms. Existence of handlooms within the precincts of textile factories is, in fact, a unique phenomenon in Kerala (especially the Malabar region). Only a dozen out of over 300 textile factories use modern equipment. Nowhere else in India can this be seen.

434 1.46 The contrast between a well-developed primary sector and a backward industrial sector is also brought out by comparative wage statistics for the two sectors. It has already been pointed out that in spite of a high degree of unemployment in the agricultural sector, the wage rates and average household earnings, though low, do not compare very unfavourably with the average for all-India. On the other hand, the average annual earnings of workers in factories covered by the Payment of Wages Act are only Rs. 736 per worker. As may be seen from the table below, this figure is one of the lowest in the whole of India.

434
171

AVERAGE ANNUAL EARNINGS OF FACTORY EMPLOYEES, 1956

| | Rs. |
|---|---|
| Andhra | 595 |
| Assam | 1,526 |
| Bihar | 1,236 |
| Bombay | 1,415 |
| Madhya Pradesh | 982 |
| Madras | 950 |
| Orissa | 947 |
| Punjab | 991 |
| Uttar Pradesh | 1,014 |
| West Bengal | 1,142 |
| KERALA | 736 |

SOURCE: *Statistical Abstract of India* (1957-58).

185 *Overhead Facilities*

1.47 In respect of overhead facilities, Kerala is fortunately better placed than many other parts of India. This has been the result of a progressive policy followed by the Governments of the erstwhile States of Travancore and Cochin, whose rulers took an active interest in the development of various public amenities and tried to attract industrialists from other parts of India to invest in Kerala.

496 1.48 In the sphere of transport, the coverage of Railways is rather limited, total 491 route mileaghe being only 543 miles. This is, however, more than compensated by the wide network of roadways, which in spite of its many drawbacks, is superior to that in most other parts of India. The extent of road mileage per 100 square miles as well as the vehicle density in Kerala are the highest in the country. Road transport is, in general, more suited to conditions prevailing in Kerala than Railways because of the uneven nature of the terrain.

the uneven nature of the terrains. Along the coastal strip, inland waterways are the ideal means of transporting lighter commodities. 000 505

1.49 It is well known that in standards of literacy Kerala is ahead of all the other States of India. The literate population is 46.2 per cent as compared with 23.7 per cent for the whole of India (1961 Census). Kerala has a very long tradition in imparting education on organized lines. Initiative in the spread of education was first taken by the Christian Missionaries during the middle of the last century. The State followed up by offering grant of aid to the missionary schools, and opening of new Government schools. 212 [171] [797] [658]

1.50 While the State is in the forefront of India in general education, it is hardly so in the sphere of technical education. From the point of view of future industrialization programmes, the emphasis in future will have to undergo a shift in position. During the Second Plan period considerable progress has been made in opening a number of polytechnics and other technical institutions. Their impact, however, will only be felt during the Third Plan period when qualified technicians start coming out from these institutes. 874

1.51 The State is also fairly high up in the standard of its health services although in some of the indices of health service development it lags behind all-India standards. On the other hand the *ayurvedic* system has had a long established tradition in the State and is popular among the public. Some of the indices showing the relative state of development of medical facilities are given below: 744

[171]

| | *India* (Persons) | *Kerala* (Persons) |
|---|---|---|
| One doctor for | 7,000 | 5,200 |
| One nurse for | 19,000 | 16,700 |
| One hospital bed for | 1,400 | 3,125 |

*Regional Disparities*

1.52 Although the infra-structure as a whole is well developed in the State, it is not uniformly so all over the State. Economically, Malabar, which was previously a part of the Madras State, is on a distinctly different plane from the Travancore-Cochin area. Unlike the erstwhile States of Travancore and Cochin, Malabar did not receive the benefit of State patronage. At present Malabar is backward compared to Travancore-Cochin in terms of almost all the indicators of economic development. Both the transport and education system are not as well developed in Malabar as in Travancore-Cochin.[1] It lags behind industrially as well. Unemployment also seems to be higher in Malabar. This is corroborated by the much lower participation rate in the case of Malabar.[2] Under these circumstances, economic policy would undoubtedly have to pay due attention to the need for levelling up such wide disparities. 433* 184

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[1] Chapters on "Industries—Structure and Growth" and "Transport". (Nos. 9 and 8)

[2] Chapter on Manpower. (No. 11)

*Imports and Exports*

439 1.53 Reference has already been made to the fact that Kerala is very much of an exchange economy. On the one hand it has to import a substantial part of its foodgrain requirements from the other parts of India. No exact estimates of total import of foodgrains into the State are available. The total amount of rice arriving in Kerala by train was 3.8 lakh tons during 1958 and 4.8 lakh tons during 1959.[1] This does not, however, include imports by roads or by the sea. In addition to foodgrains, almost all the industrial raw materials like coal, alumina, iron and steel, salt, etc., are obtained from the other parts of India.

1.54 On the other hand, Kerala also contributes substantially to India's export trade. As may be seen from Table 6[3] the total value of goods exported from the ports of Kerala to the other parts of the world is roughly Rs. 55 crores per annum, but the figure has been rising over the last few years. This is quite a substantial amount, being about 10 per cent of the overall foreign exchange earnings of India. Since this State occupies only 1.2 per cent of the total area of India, in relation to its area it may be claimed to be eight to nine times more productive in terms of its foreign exchange earnings than the whole of India.

1.55 The main export commodities of Kerala are listed in Table 6. It will be seen that the three major items which contribute about 75 per cent of total foreign exchange earnings of Kerala are tea, cashewnuts and coir and coir products. Except for fish, prawns and ilmenite, all other exportable commodities originate in the agricultural sector.

439 178 1.56 Whereas exports of most of the commodities have been rising, the trend in the case of coir, pepper and ginger has not been a promising one. Of these three commodities, pepper shows the most serious decline in foreign exchange earnings. In physical quantity the export of pepper has not declined much. It was 3,3 lakh cwts. in 1951-52 and 3.2 lakh cwts. in 1958-59. The decline in foreign exchange earnings from the export of pepper has been due to a drastic fall in the world price of pepper. The crash in prices has, in turn, been primarily due to a large increase in the production of pepper in other competing countries like Indonesia, Sarawak and Malaya. Similarly,,in case of ginger and coir products no preceptible rise in exports has taken place due to competitive pressure in the foreign markets.

*Unemployment*

464 1.57 According to the Census of 1951, Kerala had a working force[2] of 4.54 million persons out of a total population of 15 million, giving a participation ratio (i.e., working force divided by total population) of 33.5 per cent. Since a participation rate of the order of 33.5 per cent is one of the lowest in the whole of India, it gives a fair indication of the very high degree of unemployment prevalent in Kerala. A low participation rate reflects the lack of adequate opportunities for gainful employment. These conclusions are borne out by the results of an unemployment

[113]

[1] *Economic Review of Kerala*, 1959: Government of Kerala.

[2] Working Force is equal to the sum of earning dependents and self-supporting persons. For a detailed note see Appendix 3.

[3] [see p. 273, category 116 -- Analyst]

survey carried out in Kerala on the eve of the Second Plan period. According to this survey, 6.3 lakh persons, that is, 4.2 per cent of the total population were openly unemployed while another 15.2 lakhs (5.2% of the population) were under-employed. This is, indeed, a very high degree of unemployment when compared with the corresponding all-India proportion of 0.58 per cent for the openly unemployed and 6 per cent for the under-employed. 464

1.58 There is some evidence to show that the level of unemployment has been rising steeply over the past few decades. Between the Census of 1931 and that of 1951 the participation rate slumped down from 48 per cent to 36.1 per cent. Although the difference in concepts used in the two Census operations exaggerates the extent of decline, it does convey some idea of the fast deterioration in the unemployment situation over the years. 464 178

1.59 Unemployment on this scale is the outcome of a high rate of population growth, unaccompanied by economic growth at a correspondingly fast rate. In spite of a large section of the population being engaged in non-agricultural activities, the rate of expansion of employment opportunities in this sector has been very low, and the pressure on agricultural sector has been constantly increasing. In the 20 years, between 1931 and 1951, according to the Census data, the proportion of population dependent upon agriculture increased from 34.2 per cent to 53.8 per cent. 464 161

1.60 The approach to the problem of unemployment has got to be two-sided. Measures to curb the rate of growth of population form one aspect of the solution. The second and the more important weapon is to accelerate the pace of industrial development so as to diversify the pattern of growth and, thus, reduce an excessive dependence on the agricultural sector. It is with this aim in view that the following chapters attempt to assess the resources available and to explore the development possibilities in each sector of the economy during the coming decade. 433* 464 [128]

## SOME RECENT TRENDS

1.61 Planned economic development, as in the rest of the country, was initiated in the State during the early years of the last decade. The First Plan of the State covered only the Travancore-Cochin region since Malabar was merged to from Kerala only after the end of the First Plan. The outlay for the First Plan was Rs. 30.03 crores. On a per capita basis the public sector outlay during the First Plan came to Rs. 32.2 per head (all-India Rs. 55). During the Second Plan, the reorganized State was allotted Rs. 87 crores. The total outlay came to about Rs. 97 crores if Central investment in the State be also included. On per capita basis, again, public sector outlay in Kerala was considerably behind the all-India figure (Kerala: Rs. 64 per head ; all-India : Rs. 118). 433* 652

1.62 Year to year estimates of growth of the State Income are not available for the last decade. This lacuna makes it difficult to assess the overall impact of the Plans on the whole economy. However, a very rough estimate has been made for growth of the State Income between 1956 and 1961 and the estimates are given in the following table. 434

434

STATE INCOME (RS. IN CRORES)—AT 1955-56 PRICES

| | | *1955-56* | | *1960-61* | *Proportionate increase* (per cent) |
|---|---|---|---|---|---|
| Primary Sector | | 172.5 | | 193.2 | 12.0 |
| Secondary Sector | | 52.3 | | 62.6 | 19.7 |
| Tertiary Sector | | 126.8 | | 144.2 | 13.7 |
| TOTAL | | *351.6* | | *400.0* | *13.7* |
| Per capita income | Rs. | 234.4 | Rs. | 240.0 | |

*433 1.63 As a result of the various measures for increased agricultural production, the value added by this sector has increased but not by any spectacular amount. Output of rice increased from 7.5 lakh tons in 1952-53 to 8.7 lakh tons in 1955-56 and 9.8 lakh tons in 1959-60, the increase between 1956–60 being 8 per cent. Other important increases during the period 1955-56 to 1958-59 were: tapioca 15 per cent; sugarcane 3 per cent, arecanut 5 per cent, rubber 6 per cent, cashewnuts 22 per cent, coconut 3.2 per cent and bananas 120 per cent. On the basis of these increments in output and shift towards a superior cropping pattern, it is estimated that the net value contributed by the agricultural sector increased by about 10-12 per cent between 1955-56 and 1960-61. A rate of growth of 12 per cent is assumed for the whole of the primary sector over the Second Plan period.

1.64 Estimates of increase in the output of industry can be made only with the help of indirect indicators. There is generally a high correlation between increase in the consumption of electrical energy and output from the organized factory sector. [377] On the basis of data for the utilization of electric energy in industries, factory output has been estimated to have increased from Rs. 18 crores in 1955-56 to Rs. 24.4 crores[1] in 1960-61.

1.65 Non-factory sector output is estimated to have increased from Rs. 32.3 crores to Rs. 35.5 crores.[2] The rate of increase of output from the secondary sector as a whole, therefore, comes to be 19.7 per cent. The rate of industrial growth may have been higher but for the fact that during the Second Plan period industries could not develop at the anticipated pace as a result of non-execution of all the power projects planned earlier. Foreign exchange difficulties were the main obstruction in the way of implementation of Plans for power projects. Consequently effective

[1] During 1955-56, the relationship between factory sector output and electricity consumption works out to Rs. 0.8/kWh. According to NCAER's study *Demand for Energy in India* this coefficient is likely to decrease with the passage of time both as a result of the spread of power-using equipment and through the expansion of electric-intensive industries. By 1960-61, the co-efficient in case of Kerala is expected to have decreased to Rs. 0.65/kWh. The industrial consumption of electricity by 1960-61 is expected to have reached 376 m. kWh. On the basis of the co-efficient of Rs. 0.65/kWh, the output from factory sector is estimated to have reached Rs. 24.4 crores, by 1960-61.

[2] Non-factory sector output is assumed to have increased in the same ratio as gross purchasing power. Gross purchasing power depends upon rise in population as well as the rise in per capita income, that is, it is correlated with increase in over-all level of income. Since output from the non-factory sector mostly caters to the needs of the local village population, it is not very unreasonable to assume that output from this sector has increased at the same rate as income originating from agriculture, which roughly represents the level of purchasing power in the rural areas.

capacity increased from 89.6 MW to only 100 MW during the Second Plan period. 433*
Total availability of electrical energy increased from 347.1 million kWh (1955-56) [377]
to 515 million kWh (1958-59) mainly through an increase in the load factor.

1.66 Tertiary incomes generally grow at about the same pace as the commodity 433*
output, that is, output of the primary and secondary sector combined. Tertiary 434
income is assumed to have risen at 13.7 per cent, the same as the State Income. On these premises projections for sectoral increase in the State Income (at 1955-56 prices) of Kerala have been given in table under paragraph 1.62. State income is expected to have increased by 13.7 per cent but most of this rise has been absorbed by the increase of population. Consequently the per capita income at constant prices is likely to have arisen from Rs. 234.4 (1955-56 prices) to only Rs. 240.7 in 1960-61.

1.67 This has been rather a slow rate of development. Obviously Kerala needs 433*
a higher rate of growth, much bigger plans that would generate it, and a strategy of development that would ensure it These aspects are considered and discussed in
the chapters that follow. The picture which emerges out of the aggregation of [128]
sectoral plans is discussed in Chapter 12 dealing with the pattern of growth.

## Chapter 2

# Agriculture and Plantation Crops

### DISTINCTIVE FEATURES OF AGRICULTURAL SECTOR

161 241 A NUMBER OF distinctive features are characteristic of the agricultural sector of Kerala. In the first place, Kerala surpasses all other regions of India in respect of the high pressure of population on land. Secondly, on account of the large number of valuable cash crops, the agricultural sector is more commercialized in the State than elsewhere. Thirdly, food production has always been far short of Kerala's requirements.

311 423 171 2.2 With the fast rising density of population, the margin of cultivation has been constantly receding. The proportion of net sown area to total geographical area is consequently much higher in Kerala (47.16%) than in the rest of India (all-India: 39.1%). The average size of land-holdings, however, is much smaller (1.5 acres) in Kerala (all-India: 7.5 acres). In the Travancore-Cochin area, 66 per cent of the holdings are below one acre in size. (Table 7)[2]

464 241 [171] 2.3 The scarcity of land in relation to population has been responsible for an acute state of unemployment and under-employment among the people in the rural areas. Unemployment is about three to four times higher in Kerala than in the rest of India. The acute state of unemployment is also accounted for by Kerala's cropping pattern which is comparatively less labour absorbing than in many other parts of India. The perennial crops which take up 47 per cent of the cultivated area need labour recurrently only for maintenance and harvesting[1] although crops like tea and rubber require human labour on a large scale for picking of the green leaves and tapping of rubber. The perennial crops require very little labour for basic operations such as preparation of seed bed, sowing, etc., except once in their life time.

*433 241 434 2.4 However, the fact that the cropping pattern of Kerala is not labour-intensive is compensated to some extent by the higher value yield of the perennial crops per cultivated acre. The soil structure and climatic conditions in Kerala favour a high value yielding cropping pattern. On an average, cash crops contribute Rs. 100 crores (65%) to the income from agriculture (Rs. 151 crores). Of the cash crops, coconuts occupy 20.2 per cent of gross cropped area, standing next only to paddy which occupies 35.8 per cent of the gross cropped area. But the value yielded per acre for coconuts (Rs. 446) is more than twice that for paddy (Rs. 212). The position regarding the other crops is given in Table 9.[3]

*433 241 2.5 In respect of plantation crops the only other State which approaches closest to Kerala is Assam where the proportion of cultivable area devoted to plantation

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[1] This aspect is discussed in greater detail in the Chapter on Manpower No. 11.

[2] [see p. 273, cat. 116 -- Analyst]

[3] [see p. 275, cat. 116 -- Analyst]

crops is about 8 per cent of the gross cropped area. A direct consequence of this 433*
type of cropping pattern is the high degree of commercialization which has been 241
attained in the agricultural sector. This has important implications for the State economy. The State exports its commercial crops, and imports its foodgrain requirements. In this exchange the State stands to gain since cash crops yield far higher return per unit of area than the food crops. Secondly, quite a few of the commercial crops grown in the State are of a perennial nature and require large investments. This has led to the establishment of numerous large scale organized plantations and farms, although small farms also play an important role.

2.6 A chronic food deficit is the third important feature of the agricultural sector, 433*
mentioned above (para 2.1). The current production of foodgrains is roughly 241
967,000 tons. Current requirements on the basis of a norm of 17 ozs.[1] of foodgrains 242
per day per adult (unit) work out to a figure of 24 lakh tons. The gap between food requirements and the current level of production thus works out to over 50 per cent of total requirements. This is higher than in any other State. However, this need not cause excessive anxiety. It is not necessary for every State in the Union to try and achieve self-sufficiency in food at the cost of other more valuable commercial crops. From the long run point of view, the aim should be to strike a balance between supply and demand for foodgrains at the national, rather than, strictly, at the level of the State. The psychological desire to attain a balance between local supply and demand for foodgrains in the State is a legacy of the lean period of 1940–50 when the State was hard hit by the severe food shortage prevailing in the country.

*Climate and Geographical Factors*

2.7 The climate and rainfall in Kerala are excellently suited to the prevailing 132
cropping pattern. The climate is cool and humid in the high ranges while it is humid and warm in the plains. The range of temperature variations during the year is very small, the maximum never going beyond 90°F and minimum rarely below 75°F. The humidity, however, is very high in the rainy season—about 90 per cent. The State is fortunate in respect of rainfall. The normal annual rainfall is 95 inches a year; it may be as high as 150 inches in the high ranges, but nowhere it is less than 65 inches. Most of the precipitation occurs during May to September when the State receives the south-west monsoon. Taking the State as a whole, it may be said that it is one of the most wet areas in the country (Table 1).[2] Assam has about the same normal rainfall as Kerala. Only the Konkan coast (Bombay) and South Kanara (Mysore) exceed it. The annual deviation in rainfall is also comparatively low with the co-efficient of mean deviation at 6.5 per cent for Travancore-Cochin and 9.2 per cent for Malabar (Table 1). On the whole rains are more reliable in Kerala than in most other States.

2.8 Kerala has two distinct geographical divisions, namely, the Travancore- 134
Cochin and the Malabar area. The soils of Travancore-Cochin area are generally

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[1] The Nutritional Advisory Committee to the Government of India recommended 18 ozs. of foodgrains per [146]
adult unit per day as the desirable norm. We have used a slightly smaller figure (17 ozs. per day) in our calculations.

[2] [Table 1, appearing on p. 269 of the text, has not been processed – e Analyst]

134 formed of gneissic debris by sub-aerial decomposition. The formation of coastal areas consists mostly of sands deposited by the sea. The soils are generally of poor fertility status. Some peculiar formations are found in the taluks of Ambalapuzha, [135] Kuttanad, Vaikom and Shertallai and go by the name *peaty* or Kari soils. These are black and heavy and contain plenty of potash and 10 to [illegible]0 per cent organic matter. However, the soils are highly acidic due to the decomposition of organic matter under anaerohic conditions, presence of iron and aluminium salts and absence of [242] nitrification. Attempts to reclaim the soils by liming and improvement of drainage have so far proved unsuccessful. In Trichur and Mukundapuram taluks there is yet another category known as *Kole* soils. These are fertile alluvial soils. The soils of Malabar area are quite different. They are mostly red soils formed *in situ* from the micaccons or granitic rocks below under the influence of weather and climatic conditions. The fertility of the red soil is poor. They contain very low proportions of organic matter and nitrogen. But these soils contain ferrous and aluminium ions in fairly large proportions and in the absence of humous this situation results in reversion of phosphate—a state where phosphorous when applied in the form of fertilizers, does not become readily assimilable by the plants.

### *Land Utilization*

311 2.9 The fact that Kerala has drawn upon the margin of cultivable land much more than in the rest of India is borne out clearly by Table 8.[2] The net sown area in the State during 1956-57 was 4,525,000 acres, that is 47.16 per cent of the total area. This is about 8 per cent more than corresponding all-India proportion (39.1%). The proportion of fallow lands in Kerala is also very low. (Kerala 4.4% : all-India 7.5%). A higher proportion of total area devoted to cultivation becomes all the more significant in view of the fact that forests cover about 26 per cent of the total area of the State compared to the all-India average of 17.44 per cent.

2.10 During the period 1951–57, there has been an overall improvement in the pattern of land utilization in the State. There have been significant increases in the area under forests (15.8%), permanent pastures (19.8%), land under tree crops (18.1%), net area sown (29.8%), and the area sown more than once (24.9%). These increases were mostly at the expense of cultivable waste, which declined by about 40 per cent during the period. The next important decline (16.7%) was in the barren and uncultivable lands. The area sown more than once rose by about 25 per cent, but this was partly offset by an increase of 35 per cent in the area under current fallows. (Table 8)[2]

2.11 Another notable feature of the agricultural sector in Kerala is the high intensity of cropping.[1] During 1956-57, the gross sown area was 5.6 million acres and the net sown area was 4.7 million acres. This works out to a crop intensity of 119 per cent (all-India 113%; Punjab 130%; Maharashtra 120%). However, if the field crops alone are taken into account, crop intensity works out to as high a figure as 150 per cent. It is the latter percentage which gives a more accurate idea of the

[text continues on p. 25]

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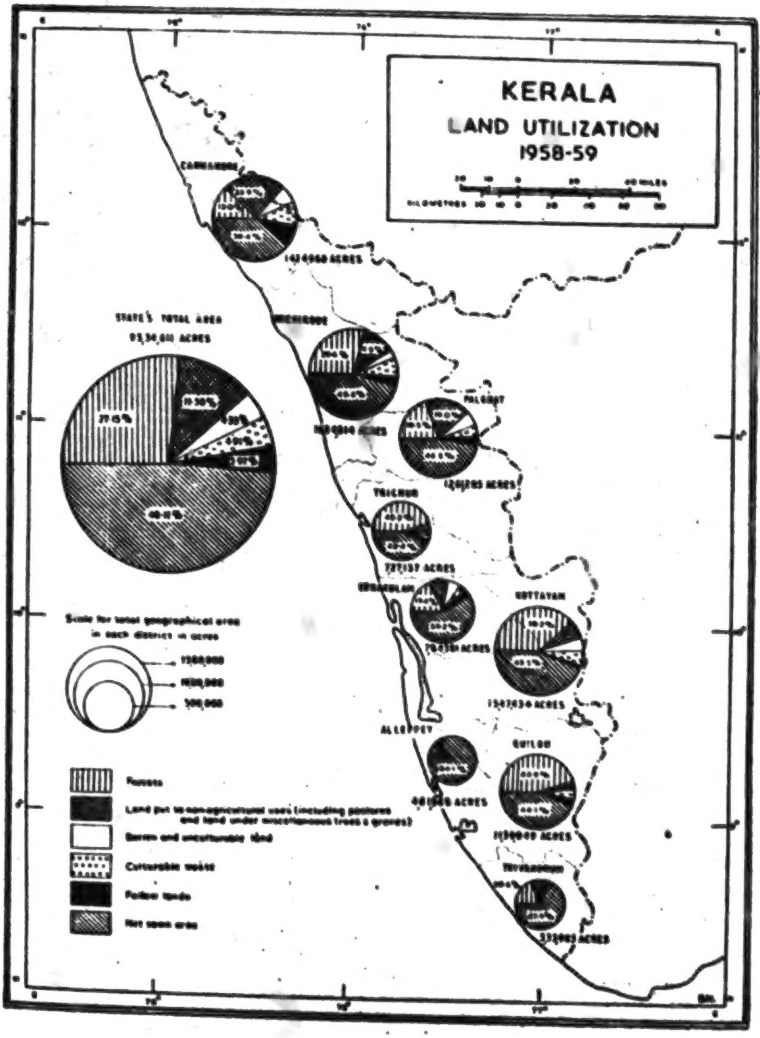
[1] Intensity of cropping is the ratio between gross cropped and net cropped area.

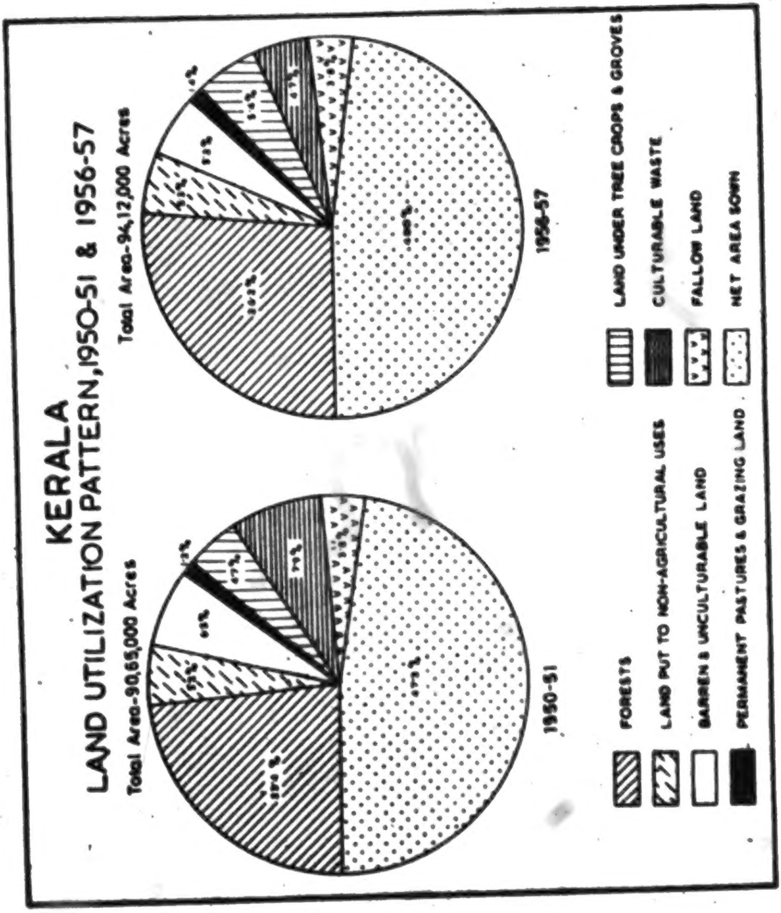
[2] [see p. 274, category 116 -- Analyst]

MAP 5


KERALA
LAND UTILIZATION
1958-59
MILES
KILOMETRES
CANNANORE
KOZHIKODE
PALGHAT
TRICHUR
727137 ACRES
ERNAKULAM
KOTTAYAM
ALLEPPEY
QUILON
TRIVANDRUM
STATE'S TOTAL AREA
27.15%
11.30%
Scale for total geographical area in each district in acres
1500,000
1000,000
500,000
Forests
Land put to non-agricultural uses (including pastures and land under miscellaneous trees & groves)
Barren and unculturable land
Culturable waste
Fallow lands
Net sown area

102
131
311
634

CHART 1


KERALA
LAND UTILIZATION PATTERN, 1950-51 & 1956-57
Total Area-90,65,000 Acres
Total Area-94,12,000 Acres
1950-51
1956-57
FORESTS
LAND PUT TO NON-AGRICULTURAL USES
BARREN & UNCULTURABLE LAND
PERMANENT PASTURES & GRAZING LAND
LAND UNDER TREE CROPS & GROVES
CULTURABLE WASTE
FALLOW LAND
NET AREA SOWN

intensity of cropping since the area covered by perennial crops, which is quite large 311
in the case of Kerala, is irrelevant from the point of view of double or triple cropping. It will thus be seen that not only is the proportion of cultivable area to total area high in Kerala, but the degree of utilization of the cultivated area is also quite high.

## FIELD CROPS

2.12 The techniques of cultivation as well as the economics of field crops differ 241
widely from that of commercial plantation crops. The field crops are generally 128
characteristic of the subsistence economy whereas the latter are largely market-oriented. Moreover, unlike field crops the plantation crops are perennial and do not require annual repetition of preliminary agricultural operations like ploughing, sowing, etc. The returns too vary widely. Field crops and plantations are, therefore, discussed separately in the pages that follow.

### *Cropping Pattern and Yields of Field Crops*

2.13 Rice, the most important field crop, occupies a prominent place in the 433*
agricultural economy of Kerala. In 1958-59, it covered 1.9 million acres out of 243
2.7 million acres under field crops. The production of rice in the same year was 939,000 tons. While the rice acreage fell by only 0.4 per cent during 1951–59, its production during the same period leapt up by over 31 per cent. Increase in the yield rate during the same period was from 829 to 1,108 lbs. per acre (Table 11).[2] The growing appreciation among farmers of the utility of fertilizers, improved seeds and better techniques of cultivation is largely responsible for this steady improvement.

2.14 Next to rice, tapioca is the most important field crop of Kerala. During 433*
1951–59, the area under the crop increased from 506,000 acres to 553,000 acres, 244
that is by 11 per cent. The production of tapioca in 1958-59 was 1.5 million tons, that is, an increase of 4.6 per cent over 1950-51.

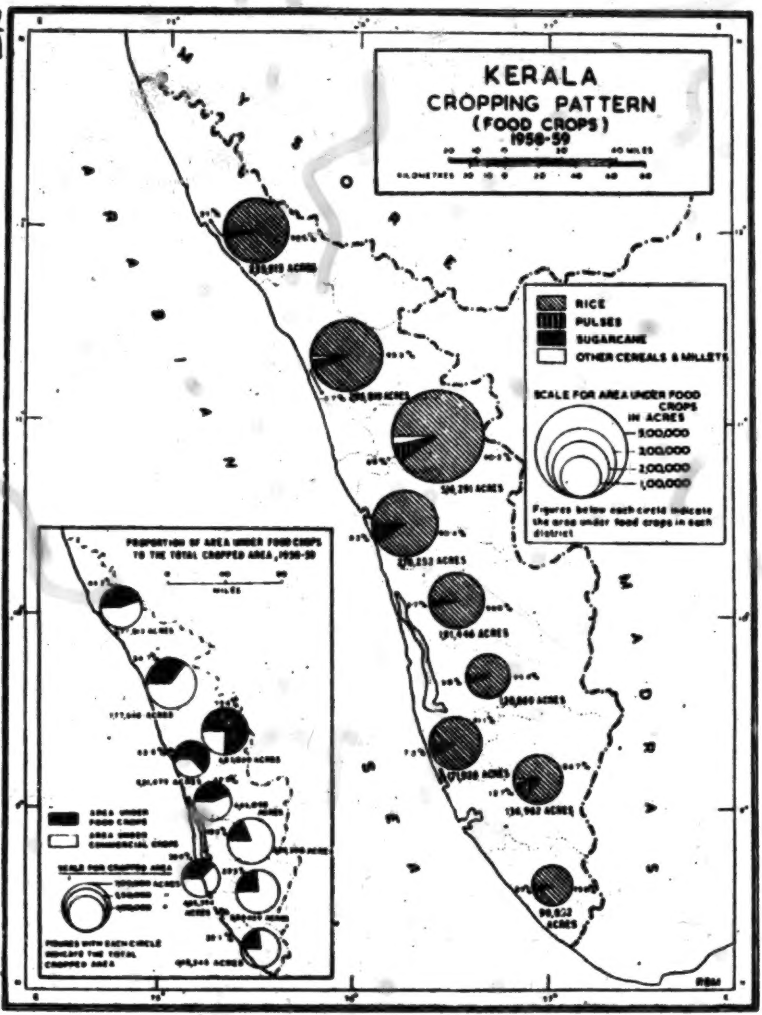
2.15 Tapioca and rice considered together, account for over 54 per cent of the 433*
net sown area which is the same as 90 per cent of the area under field crops. Among 241
the remaining field crops, ginger, groundnut, sesamum, sugarcane and pulses are the most important ones. Ginger is primarily an export crop, and its fortunes [439]
fluctuate with the trend of foreign markets. During the recent years, the area under ginger has steadily declined from 30,000 acres in 1950-51 to 22,000 acres in 1958-59. Other field crops, however, have shown significant increases in area over the same period. The rate of increase is the highest for sugarcane, where it rose from mere 2,000 to 22,000 acres—an increase of 1,000 per cent in less than a decade. This is due to the commissioning of a sugar factory (900 tons crushing [257]
capacity per day) at Thiruvella in 1954. The output of sugarcane, however, rose by only 775 per cent. The next highest increase has been in pulses where the area rose by 287 per cent between 1951 and 1959. Pulses, with the exception of *tur* (*Cajanus indica*), are now increasingly raised as second or even third crop by availing of the moisture left in the soil after the harvest of paddy. This development owes

[2] [see p. 277, category 116--Analyst]

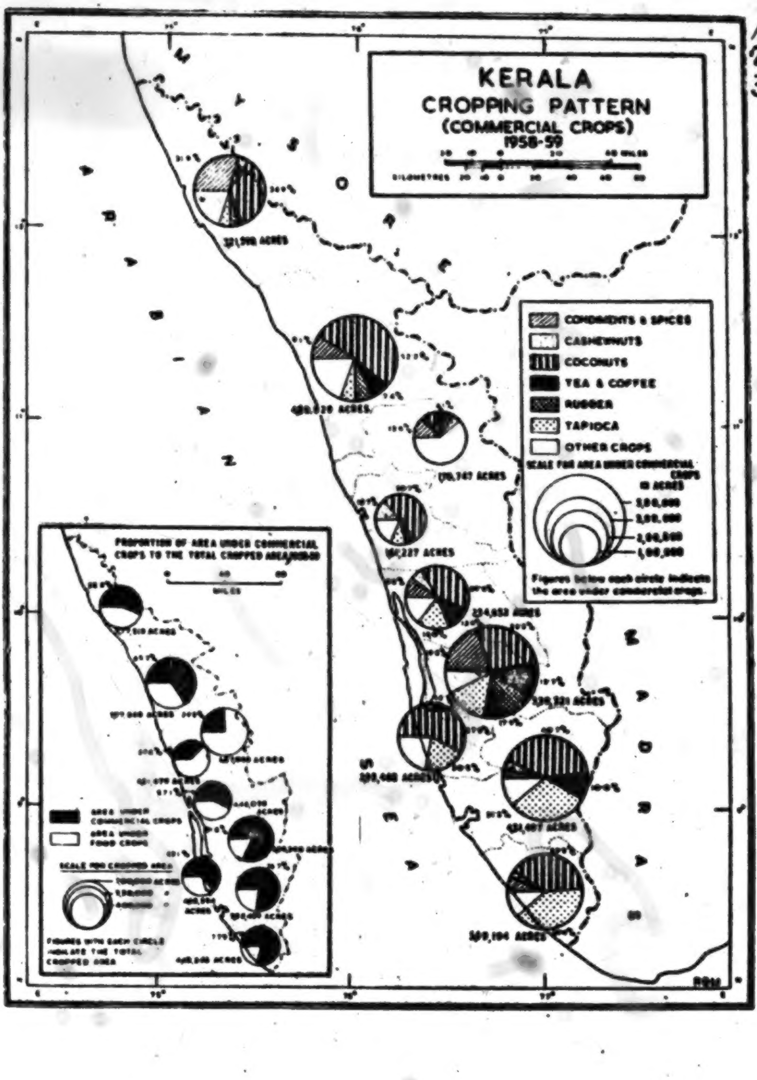
[text continues on p. 28]

MAP 6

102
241
311


KERALA
CROPPING PATTERN
(FOOD CROPS)
1958-59
MILES
KILOMETRES
RICE
PULSES
SUGARCANE
OTHER CEREALS & MILLETS
SCALE FOR AREA UNDER FOOD CROPS IN ACRES
5,00,000
3,00,000
2,00,000
1,00,000
Figures below each circle indicate the area under food crops in each district
PROPORTION OF AREA UNDER FOOD CROPS TO THE TOTAL CROPPED AREA, 1958-59
MILES
AREA UNDER FOOD CROPS
AREA UNDER COMMERCIAL CROPS
SCALE FOR CROPPED AREA
FIGURES WITH EACH CIRCLE INDICATE THE TOTAL CROPPED AREA
ARABIAN SEA
MYSORE
MADRAS
RBM

MAP 7


KERALA
CROPPING PATTERN
(COMMERCIAL CROPS)
1958-59
MILES
KILOMETRES
CONDIMENTS & SPICES
CASHEWNUTS
COCONUTS
TEA & COFFEE
RUBBER
TAPIOCA
OTHER CROPS
SCALE FOR AREA UNDER COMMERCIAL CROPS
IN ACRES
1,00,000
Figures below each circle indicate the area under commercial crops.
170,747 ACRES
161,227 ACRES
224,653 ACRES
389,194 ACRES
PROPORTION OF AREA UNDER COMMERCIAL CROPS TO THE TOTAL CROPPED AREA 1958-59
MILES
AREA UNDER COMMERCIAL CROPS
AREA UNDER FOOD CROPS
SCALE FOR CROPPED AREA
FIGURES WITH EACH CIRCLE INDICATE THE TOTAL CROPPED AREA

*433 241 its success to the persevering efforts of the State Agriculture Department. The department has made a successful drive for pulse cultivation with a view to (*i*) raise the production of pulses in which the State is grossly deficit, (*ii*) to increase crop intensity, and (*iii*) to enrich soils by including a legume in the rotation.

2.16 During the same period the area under oilseeds rose by about 131 per cent. The area under all the millets, except ragi which rose by about 9 per cent, has registered a decline ; jowar area has declined by 33 per cent, and small millets by 53 per cent. Perhaps the increase in the area under some of the higher value crops such as oilseeds and sugarcane was at the expense of inferior and low value millet crops. This is another indication of the growing preference for high value crops. (Table 10)[1]

2.17 Land productivity is generally high in Kerala and compares very favourably with that in the other States of India. Yield of rice, the principal crop, was 1,108 lbs. per acre in 1958-59, which is about 20 per cent higher than the all-India average. Only the States of Madras and Andhra have higher yields. During 1951–59 the rice yield has increased by about 25 per cent (Table 11)[2] as a result of increased application of fertilizers, improved seeds and better agricultural practices. Similarly ragi is another high yielding crop with a yield of 1,290 lbs. per acre (1958-59)—the highest in India.

2.18 On the whole the yield rates for most of the crops have improved between the years 1951–59. For cotton and ragi, as in the case of paddy, the increase has been quite significant. On the other hand, there was a decline in the yield rate of jowar, groundnut and sugarcane. (Table 11)[2]

*433 438 241 2.19 The latest districtwise disposition of area and production show that Palghat has the largest concentration of important food crops grown in the State. In 1958-59 it accounted for 29.2 per cent of the area under rice and one-third of rice production in the State. Palghat also leads in the production of millets and pulses. The district of Kottayam leads in plantation crops as well as in some of the other cash crops, for example, it had 32 per cent of area under ginger, 29 per cent of area under turmeric and 16.9 per cent of area under sugarcane.

2.20 There is a considerable degree of regional specialization in some of the minor field crops. For example, Palghat accounts for over 90 per cent of the area for the production of cotton and groundnut in Kerala. Similarly sesamum is concentrated in Alleppey (61%), tur (56%) and smaller millets (69%) in Palghat, and chillies (51%) and tobacco (95%) in Cannanore. This specialization is due to favourable conditions for the cultivation of these crops in the areas where they are being grown.

*433 241

### *Future Development*

2.21 It is generally known that agriculture aids economic development in three different ways. By providing a surplus of food requirements, it sustains a growing urban population. Secondly, agriculture is an important source of industrial raw materials and, in under-developed regions, generally forms the base for a large number of industries. This is particularly so in Kerala where over 70 per cent of the factory workers are employed in agro-based industries. Lastly, higher agricultural yields [464]

[1] [see p. 276, category 116--Analyst]

[2] [see p. 277, category 116--Analyst]

ensure a better return to the farmer. This creates an incentive for achieving a still higher level of production. And at the same time, the rise in agricultural income provides a substantial purchasing power for absorbing consumer goods output of the industrial sector. The need for an emphasis on agricultural development is, therefore, very much inter-related with steady industrial growth. 433* 241

2.22 Agricultural development in Kerala can follow two possible directions. First, the aim could be to raise the yield rate and output of the existing crops with a special emphasis on increasing the food production. Alternatively, the policy could be directed towards bringing about a modification in the existing cropping pattern by giving greater weightage to the commercial crops and thus ensuring better returns from the land. On the basis of available evidence; it seems that for Kerala the latter course of action would be the more appropriate one. It has already been pointed out that it is not necessary for each State to try to achieve, complete self-sufficiency in foodgrains. 433*

2.23. A wide gap in food requirements of the extent which exists at present in the State, can be covered only through extension of area under paddy in addition to increase in the yield per acre. Whereas efforts at raising the yield rate are justified by all means, it would be unwise to divert land from commercial crops to the cultivation of paddy. Apart from direct importance of cash crops to the industrial growth of Kerala in the form of raw material supply, commercial crops make a substantial contribution to the industrial effort of India through the large amount of foreign exchange earnings they bring in annually. Export of commodities like tea, pepper, cardamom, cashewnut and coconut products from Kerala earn foreign exchange to the tune of Rs. 55 crores every year—roughly one-twelfth of overall foreign exchange earnings of the entire country. It would, therefore, be in the interest of the State economy to maximize returns from land by growing higher value crops in place of low value crops like tapioca and small millets in as much area as possible. This would require a reversal of the policy pursued so far in favour of attaining self-sufficiency in food within the State. The gap in food requirements which cannot be covered through intensive measures of paddy cultivation could continue to be met by imports from the other parts of India. Since the relative advantage lies in the cultivation of commercial crops, some of which can be grown only in Kerala, attention should be focussed on the development of cash crops whereas the problem of wiping out the food deficit can be relegated to a secondary place for the present. 433* 262 439

2.24 The extension of the area under commercial crops should be undertaken on a scientific and planned basis. Considerations such as gross value of product per unit area and demand for the crop and suitability of soil are some of the important aspects that have to be examined in this connection. It is not possible to state the exact extent and nature of substitution without an intensive land use potential survey of different regions. A survey of this type was being carried out by the State Agriculture Department. However, the future scope for some of commercial field crops is analysed below on the basis of whatever information is available. The possibilities of commercial plantation crops are discussed in the last part of this chapter. 433*

## EXTENSION OF CULTIVABLE AREA

### *Cotton*

*433 248 2.25 Prior to 1956, Kerala was considered unsuitable for the cultivation of cotton. In that year an experiment was made on a pilot scale and the results were so encouraging that the area under Sea Island (long staple) cotton rose from 126 acres in 1956 to about 3,500 acres in 1959-60.

2.26 Sea Island cotton yields superior lint which can be spun into high count expensive yarn. The latter finds a good market within the country and at present has even got to be imported. The extension of area under this crop will help in saving valuable foreign exchange and it would also provide scope for development of such industries as ginning, baling, spinning and cotton seed oil extraction.

2.27 In view of the above factors it is desirable to undertake further extension of area under cotton. A part of this increase can take place at the expense of acreage under tapioca, which is a low yielding crop. [244] About 0.2 to 0.3 million acres out of 0.56 million acres under tapioca can be diverted in this way during the next decade. Efforts should, however, be made to keep the output of tapioca at the existing level by raising its yield which is at a very low level.

[243] 2.28 There is also scope for diverting some highland area under single cropped paddy to Sea Island cotton since such a diversion would yield high returns in terms of value. The exact scope for such a diversion can, however, be ascertained only after the proposed land-use survey has been conducted.

2.29 Assuming 0.3 million acres are brought under Sea Island cotton, as suggested above, additional production of long staple cotton may be expected to reach a level of 192,000 bales by 1970-71.

### *Sugarcane*

*433 249 2.30 Sugarcane is a high value crop, and, therefore, is quite popular with the farmers. But it is one of those crops whose future extension of area is very much dependent upon the growth of sugar manufacturing industry. Its exact scope will, therefore, depend upon the growth of sugar factories.

[171] 2.31 The yield per acre of sugarcane in Kerala is very good (Kerala 40,000 lbs. per acre ; U.P. and Bihar 25,000 lbs. per acre ; all-India 28,000 lbs. per acre) and can be raised to 55,000 lbs. per acre. This factor favours the extension of sugarcane cultivation and the setting up of new sugar mills. At present there are about 25,000 acres under this crop in Thiruvella area, mostly concentrated around the Pampa river sugarcane factory. There is scope for a large increase in sugarcane acreage in the districts of Palghat, Trivandrum and Ernakulam which possess the requisite irrigation facilities. By 1971, the area under sugarcane may be doubled to about 50,000 acres.

### *Ginger*

2.32 Ginger is a very high value yielding crop (Rs. 1,077 per acre). In view of good demand prospects for ginger in both internal and external markets, the production of ginger should be stepped up. The proposed phyto-chemical plant at Munnar would 433* also consume large quantities of raw ginger. The area under ginger cultivation can 249 be extended by 20,000 acres and attempts should be made to raise productivity to one ton per acre through better cultivation techniques, seed selection and use of higher dosage of fertilizers. The likely annual increase in output from these measures is expected to be of the order of 33,000 tons in terms of dry ginger.

### *Oilseeds*

2.33 Oilseeds, other than coconut, account for only a very small proportion of the cropped area, but there is scope for raising the yields and extending the area under these crops as a substitute crop in tapioca fields and in young coconut gardens. In addition, castor cultivation may be introduced in the State along field borders which are considerably wide on the banks of rivers and streams and on the borders of gardens and plantations. Assuming that the measures for increased production are reasonably well implemented, the additional production of edible oilseeds by 1971 would be of the order of 20,000 tons annually.

### *Banana*

2.34 Since bananas need frequent irrigation, cultivation of this crop is quite 433* popular in Kerala, especially on the banks of the rivers and near other sources of water. In view of the very high calorific value of bananas as well as good future 245 demand prospects, the production of bananas should be increased. It is not possible to give an exact idea of the extent to which the area under this crop can be increased but there is scope for growing the crop more intensively in compounds attached to residential houses and in areas which receive the benefits of perennial irrigation.

### *Pineapple*

2.35 There is quite a large demand for pineapples from Kerala, as they are good both in size and in quality. Location of a few additional canning units in the State is likely to add further to the demand. Steps should, therefore, be taken to increase pineapple production. There is scope for fresh plantings in the hilly slopes of Malabar, which at present contain only wild growth.

### *Lemon Grass*

2.36 Lemon grass owes its importance to lemon grass oil which is extracted from 433* the grass. Kerala produces over 88 per cent of the world output of lemon grass oil, 249 most of which is exported. It is a good foreign exchange earner. The output of [439] lemon grass oil has been increasing year after year in spite of unsteady and fluctuating market conditions. From a mere nine tons in 1920, the output rose to 1,400 tons in 1957.

*433 249 2.37 The lemon grass oil industry in Kerala has good scope for expansion provided the prices are kept competitive. However, since the Second World War some of the Latin American countries have started cultivation of lemon grass on a commercial scale and extraction of oil with efficient methods of distillation. Compared to these countries both the yield of grass as well as its oil content are low in Kerala. Internal demand is also likely to increase considerably in view of the new synthetic chemical industries that are going to be set up within India in the near future. It is, therefore, suggested that the present level of output of lemon grass oil may be raised through measures such as manurial trials, evolution of high yielding and quick maturing strains, control of pests and diseases, designing of efficient stills of small capacity to suit the needs of small growers, etc.

## MEASURES FOR INCREASING PRODUCTIVITY

*433 2.38 Replacement of some of the low value crops by high value ones, as indicated above, should be taken up side by side with raising the yield rate of different crops. There is good scope for increasing the yields which can be achieved through (*i*) greater coverage by improved seeds, (*ii*) larger application of manures and fertilizers, (*iii*) increase in irrigation facilities, and (*iv*) improved agricultural practices. These measures are discussed separately in the succeeding pages.

### *Improved Seeds*

*433 242 2.39 Improved seeds are found to increase the yields by 10 to 15 per cent, on an average, while in case of certain crops like sugarcane, hill paddy, groundnut, etc., the output may even go up by 25 per cent. The area covered by improved seeds is very low in Kerala except in the case of paddy and sugarcane, where it is as high as 50 per cent and 90 per cent respectively of the area under these crops. Farmers in Kerala are aware of the benefits of higher productivity of improved seeds, but are unable to take advantage of it owing to inadequate supplies and delay in delivery. According to the Department of Agriculture, the improved strains available with them are suitable to cover about 60 per cent of area under paddy in the State.

2.40 Complete replacement of local seeds by improved seeds would require a large number of strains which can suit all conditions. Evolution of new strains either by breeding or by selection is a long term process requiring facilities and funds. A programme of full coverage is possible only when the number of seed farms to produce and multiply the necessary seeds is large enough. By the end of the Second Plan, the State was expected to have 24 seed farms in addition to a large number of certified growers who were to multiply the nucleus seeds.

2.41. During the next 10 to 15 years the State should aim at complete replacement of local seeds by improved seeds. For a programme of this size, the existing number of seed farms and certified private farms would have to be increased considerably. Due to difficult terrain and scarcity of land, the area of a seed farm in Kerala generally does not exceed 15 acres—of which only one-third may be suitable for wetland cultivation. The number of nucleus seed farms to cover a given area with improved seeds would, therefore, be much larger in Kerala than elsewhere in the country. For full coverage of the area by improved seeds, it is estimated that by 1971, 120 new farms would have to be organized. Investment on each of these farms, including a seed store, would be about Rs. 75,000. Total investment on additional seed farms would, therefore, amount to about Rs. 90 lakhs. Assuming an increase of 10 per cent in yield, additional production due to full coverage from improved seeds by the end of the Fourth Plan would be about 75,000 tons of foodgrains alone. Similar increases may be achieved for other agricultural commodities also. 433* 242

*Manures and Fertilizers*

2.42 The soils of Kerala are not fertile. Being of lateritic origin they are highly porous. More than 50 per cent of the cultivated soils contain less than 15 per cent of clay complex. Continuous cropping accompanied by heavy leaching (a direct consequence of heavy rainfall) has made the soils extremely deficient in phosphates, nitrogen and potash, and also in calcium, magnesium and other minor elements. 134

2.43 Inspite of the poor fertility of soils, the crop yields are good. This is primarily due to the application of a large amount of organic manures to the fields. In addition to organic manures, the farmers also use fertilizers. Farmers of Kerala were among the first to realize benefits of fertilizers and put them to use. But the quantity used is small owing to inadequate supplies. Even a modest consumption target of 14,200 tons of fertilizers[1] per annum for the Second Plan had to be revised to 5,800 tons on account of this shortage. During 1958-59, the State consumed 5,000 tons of nitrogenous ferilizers mostly in the form of ammonium sulphate and potassic fertilizers. This works out to roughly 1.2 lbs. per acre of nitrogen and less than 0.1 lb. per acre of phosphate and potash. 433* 241

2.44 In future, the emphasis should be placed both on manures and on fertilizers. Organic manures, in addition to providing the plant nutrition, help in conditioning the soil, whereas fertilizers are necessary for supplementing nutritional needs which the organic manures are not able to provide fully. A joint and balanced application of organic manures and fertilizers is, therefore, necessary for getting the desired results.

2.45 All possible sources in the State should be fully exploited for increasing the supply of organic manures. There is scope for greater utilization of urban wastes and green leaves. There is also scope for fuller utilization of the existing production of press mud and for increasing the supply of green matter by raising green manure plants on the borders of fields and banks of river streams. The supply of organic manures may be further augmented by fuller utilization of fish waste and inedible or spoilt fish. Such possibilities should be investigated.

2.46 As emphasized above, a desired level of crop nutrition will not be possible unless manures are adequately supplemented by fertilizers. The supplementary dosage of fertilizers differs from crop to crop depending upon the nature of the crop, length of the growing period and the yield rates. The dosage is the highest for banana, with NPK (Nitrogen, Phosphorous and Potash) ratio at 150 : 150 : 300 lbs.

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[1] 9,680 tons of N, 3,720 tons of $P_2O_5$ and 840 tons of K.

*433 241 per acre, while the same for paddy is only 40 :40 :30. It is very low for leguminous crops—at 0 :20 :20 for pulses and 20 : 20 : 20 for groundnuts.[1] These dosages are not the optimum. These are just the average that may be considered adequate during a period of shortage of fertilizers. There are many farmers who apply as much as 80 lbs. of nitrogen per acre to rice while there are others who, on account of shortage of fertilizers apply only 15 lbs. per acre. Since fertilizer allocations are not made for individual crops, a dosage ratio of NPK 40 : 40 : 30 per acre may be considered as an average requirement for the State in the future. But in view of shortages in the country for phosphatic and potassic fertilizers, the dosage may be put at 40 : 20 : 15. The total annual requirements of crop fields on this basis would be 35,700 tons of nitrogen, 17,700 tons of $P_2O_5$ and 13,400 tons of $K_2O$.

2.47 In view of the peculiar soil conditions and reaction, attention will have to be paid to the correct choice of fertilizers. At present fertilizers are being used indiscriminately. For example, ammonium sulphate, the most popular fertilizer in the State, is being used even on high acidity soils. Such applications may do damage to the soil by increasing further the soil acidity. The selection of various types of fertilizers in the future should, therefore, be on rational and scientific basis, so that the fertilizers also help in correcting the soil deficiencies. Urea is, perhaps, eminently suited for Kerala. *It is, however, not possible to make any specific suggestion on the requisite* type of fertilizers for the State as adequate data on the performance of various types of fertilizers are not available. It is, therefore, suggested that a large number of trials should be conducted all over the State with a view to choosing the right type of fertilizer and dosages for various crops in different regions. The result of such trials should be made known to users through the extension machinery.

2.48 It is not possible to give a precise estimate of the increase in agricultural production from the proposed fertilizer consumption programme owing to difficulties in estimating the share of fertilizers for different crops. Knowledge about the rates of return from fertilizers for various crops, is also inadequate. Assuming, however, that roughly three-fourths of the proposed quantity is used for rice and other foodgrains, the additional production of cereals and pulses on the basis of available yardsticks may be expected to be 387,000 tons by 1970-71.

### *Irrigation*

133 2.49 *Existing Position*: Irrigation resources of Kerala are very rich. In all, there are 44 rivers in the State. The run off of water from the west-flowing rivers is estimated to be of the order of 2,560,800 million cubic feet per annum, while that of east-flowing rivers is 196,000 million cubic feet.

241 153 2.50 The first irrigation project to be taken up in the State was the Kodayar Extension Scheme which was completed by 1947. At the beginning of the First Plan

[1] Dosage for NPK (ratio in lbs. per acre for other crops) is

| | | | |
|---|---|---|---|
| Tapioca | 80 :80 :160 | Ginger | 50 :50 :100 |
| Oilseeds | 10 :20 : 20 | Sugarcane | 100 :80 :100 |
| Cotton | 50 :30 : 50 | Fruits/ Vegetables | 50 :50 :100 |

period, the State had three major irrigation projects, viz., Peechi and Chalakudy I, 241
apart from the Kodayar Extension Scheme. During the First Plan, two more projects 653
viz., Vazhani and Neyyar I were added to the list. At the time of the reorganization of States, Nanjinand area, served by the Kodayar Extension Scheme, got transferred to Madras but in return Kerala gained three projects through the annexation of Malabar area viz., Malampuzha, Walayar and Mangalam. During the Second Plan period, six more projects have been completed. By 1956-57 the total irrigated area had reached 8.29 lakh acres, that is, about 30 per cent of the net sown area under field crops.

2.51 Canals are the main source of irrigation in Kerala accounting for about 50 241
per cent of the gross irrigated area (Table 12).[2] Tanks and wells irrigate 9.28 per cent and 3.49 per cent respectively of the gross irrigated area. One interesting feature about irrigation in Kerala is that irrigation from the 'other sources' accounts for a particularly high percentage of area irrigated, viz., 37 per cent. These other sources include hill streams, small diversion works, water pumped from streams and rivers, etc. These are quite numerous in Kerala on account of the high rainfall received in the State.

2.52 *The main beneficiary from* existing irrigation facilities is paddy, accounting for over two-thirds of the gross irrigated acreage. The remaining irrigated area is shared by other food and non-food crops. The exact breakdown is not available but it is believed that banana and coconut account for much of what is left.

2.53 The benefit accruing from the 13 irrigation works which had been taken up till the end of the Second Plan and their relative importance are given in the following table.[1]

| *Benefit* | *Area benefiting* (acres) | *Percentage* |
|---|---|---|
| One new crop | 55,314 | 20.11 |
| New conversion to double cropped paddy | 63,786 | 22.98 |
| Stabilization of one crop | 25,300 | 9.11 |
| Stabilization of two crops | 120,660 | 43.48 |
| Drainage, flood control, dewatering, etc. | 12,000 | 4.32 |
| TOTAL | *277,000* | *100.00* |

2.54 It can be seen from the above table that the largest extent of benefit is received from the stabilization of two crops. Conversion of fresh areas to cultivation of paddy as a result of the new irrigation facilities is only 22 per cent of the total area benefited. A large proportion of benefit in the form of stabilization of existing crops rather than in the form of double or triple cropping is due to the fact that Kerala gets assured rainfall both from the south-western as well as the north-eastern monsoon. There are thus very few patches of land which are not able to grow paddy due to the absence of rainfall.

2.55 In terms of additional output of foodgrains, however, the benefit from [433]*
new conversions is much greater than from stabilization, as can be seen from the

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[1] Based on figures supplied by the Department of Irrigation, Kerala.

[2] [see p. 278, category 116 -- Analyst]

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following table.

| *Benefit* | *Additional output of food-grains per acre* (in tons) |
|---|---|
| One new crop | 0.5 |
| New conversion to double cropped paddy | 1.0 |
| Stabilization of one crop | 0.1 |
| Stabilization of two crops | 0.2 |

On the basis of these co-efficients, increase in output contributed by the 13 projects comes to 129,636 tons, giving a weighted average of 0.47 tons of additional output of paddy per acre.

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2.56 *Future Development of Irrigation*: Due to a difficult and uneven terrain, the cost of digging canals and constructing dams is comparatively high in Kerala. The average capital cost per acre for irrigation from major and medium schemes is roughly Rs. 885 per acre as against the all-India average of roughly Rs. 500 per acre. The expensive nature of irrigation schemes and the high level of rainfall which Kerala receives, naturally set a limit to the development of irrigation works.

2.57 The proportion of new conversions out of the total area benefited is rather small. However, double and triple cropping can be made possible only by ensuring regular water supply through the irrigation schemes. Irrigation facilities are also essential for increased application of fertilizers to the second and third crops.

2.58 A Master Plan for the irrigation resources of Kerala was prepared by the Irrigation Branch of the Public Works Department. According to it, the additional irrigation potential available in the State is about 896,000 acres. Of this 822,000 acres would be for the existing area and only 74,000 acres for conversion of dry land to irrigated area. The cost of the above programme is estimated at Rs. 79.34 crores. Rice would be the main beneficiary from this irrigation programme. Additional annual production of rice from these schemes would be roughly 4.49 lakh tons valued at Rs. 17.9 crores. In addition, if other benefits such as raising the third crop of pulses and the extension of area under high value crops like coconut, sugarcane, banana, cotton, etc., are also taken into account, the benefits may amount to another Rs. 10.0 crores. This would give a capital output ratio of about 2.5.

2.59 In view of the particular conditions prevailing in Kerala, it seems desirable that a greater emphasis should be placed on minor rather than on major irrigation works. There is justification for adopting this point of view on a number of grounds. Major irrigation works are a necessity in those areas where vast areas of cultivable land can be opened up by construction of major irrigation projects. In Kerala, as pointed out above, the benefit lies mainly in providing irrigation facilities to those areas where one crop is already being raised. Since the size of investment required for major irrigation works is much larger is comparison to that required for minor work and capital resources are scarce, minor irrigation works are far more suitable for Kerala. The nature of terrain in Kerala also makes it difficult to lay a vast network of canals. Moreover, for major irrigation works, the State has to bear all the investment cost whereas minor irrigation works help in tapping localized investible resources available with the agriculturists.

2.60 Minor irrigation works have other advantages as well. In the first place, 433* the period of construction being much shorter than in the case of major works, the 241 lag between investment and yield is comparatively short. Secondly, since the minor 653 works are executed on a decentralized basis they have greater effectiveness in utilizing the pockets of surplus manpower. The problem of organizing manpower squads is likely to be less intractable. Thirdly, in Kerala there are a large number of irrigable tracts which do not occur in contiguous blocks. These scattered areas cannot get the canal water facilities provided by major irrigation dams but there are a number of streams which are conveniently situated for minor irrigation development.

2.61 Keeping these points in view, it is suggested that during the coming decade it is not necessary to develop the full potential of 8.96 lakh acres through major irrigation projects. However, the State should try to implement the schemes which have been suggested by the Master Plan for inclusion during the Third and Fourth Plans. The list of these schemes is given in Table 15. These would benefit an area of 4.33 lakhs at an investment of Rs. 39.3 crores. On the basis of current yardsticks, additional output of foodgrains from these major irrigation schemes is expected to be 2.16 lakh tons. The Third Plan has allotted Rs. 11.23 crores for major irrigation. The balance of Rs. 28.1 crores will have to be invested during the Fourth Plan. These figures only indicate the rough order of magnitude and will have to be changed, if the cost estimates given in the Master Plan are revised after further investigation.

2.62 *Minor Irrigation*: A Minor Irrigation Team, which was appointed by the Committee on Plan projects has submitted its report on Kerala. This report reveals many interesting features regarding the scope for various types of scheme. Some of its important recommendations, which should be implemented expeditiously, are discussed below.

2.63 *Spring-fed Tanks*: There are a large number of spring-fed tanks in Kerala, but the tanks are exposed to dangers of silting, breaching by storm water and heavy evaporation losses. In order to obviate these difficulties, the streams should be tapped underground by means of open jointed pipe drains placed in a reverse filter, cutting across the springs, in preference to traditional tanks.

2.64 *Diversion Weirs and Channels*: Construction of such channels is feasible on a large scale as the Kerala rivers carry a good flow from May to February due to the two heavy monsoons. Moreover, waters from the hydro-projects, now being planned for construction in the mountains, could be diverted for irrigating the coastal plains by means of diversion works. Since most of the river beds are covered by paddy fields, any increase in the water level due to afflux above diversion weirs is resented by the people whose fields get submerged. Therefore, weirs with control gates ought to be provided.

2.65 *Lift Irrigation*: The topographical and other features of the State are eminently suited for the development of lift irrigation as there are a large number of small blocks of field located on the fringe of the rivers, spread all over the State. Another factor in favour of lift irrigation is the availability of cheap electric power. Implementation of an extended programme of lift irrigation would, therefore, be highly desirable even though the operational cost of these schemes is higher.

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2.66 *Surface Reservoirs*: Adequate provision should be made for silting capacity in tanks and reservoirs. In the case of small tanks at least about 20 per cent of the total capacity should be reserved for silting.

2.67 *Prevention of Ingress of Salt Water*: Large areas of cultivated land in Kerala are well below the mean sea level and are subject to flood by fresh water brought over by rivers in the monsoon season and salt water during other seasons. There is need for construction of suitable projects to prevent the onrush of salt water into the paddy fields. The scheme to dewater such areas should also form an important item in the minor irrigation programme.

2.68 No estimates are available for the likely area that could be irrigated from minor irrigation works. Nevertheless, it is considered to be quite substantial. It is learnt from discussions with the State Government authorities that the extent of such possibilities is around 300,000 acres. Of this, the share of lift irrigation and ground water utilization (wells, filter points, etc.) may be put at 100,000 acres. Lift irrigation and ground water utilization are works of a small size and, therefore, should be undertaken by the beneficiaries themselves with the help of Government aid.

2.69 In view of the emphasis laid on minor works, it is suggested that 200,000 acres of area (this also includes area benefited from flood control and drains) should be developed from minor irrigation sources. Of this, about half may be from lift irrigation and ground water sources. The average capital cost of providing minor irrigation would be in the neighbourhood of Rs. 1,000 per acre. Total investment for minor irrigation development schemes as suggested above would come to Rs. 20 crores. Of this Rs. 10 crores would be in the public sector and the rest will have to be provided by individual agriculturists.

2.70 The minor irrigation schemes proposed here would benefit not only rice, but also other crops such as arecanut, lemon grass and banana. For purpose of calculations it may be assumed that only half of proposed irrigation is used for rice. The additional production of rice on account of minor works would thus be about 50,000 tons annually by 1970-71.

### *Improved Agricultural Practices*

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2.71 Agricultural practices in Kerala are relatively of advanced type. Rice, the principal food crop of the State, is cultivated quite intensively. Transplanting is practised all over the State, even under the submerged type of cultivation. In case of dry seed bed crops like tapioca, ginger, groundnut, etc., the farmers generally take care to see that interculture and earthing operations are satisfactorily done.

2.72 However, there is further scope for increasing crop yields by improving the agricultural practices and techniques. Improved practices such as scientific crop rotation by including a legume crop as against the existing practice of successive rice crops, deep ploughing, adequate plant protection, etc., can increase the yields to some extent.

2.73 With the proposed increase in irrigated area it would be possible to raise a third crop of pulses either of black gram or green gram in succession to two crops of paddy. This would not only give additional production of pulses which are deficit in the State, but also enrich the soil by leaving a nitrogen residue, and thereby constitute a better rotation. It may be possible to develop pulse crops on 250,000 acres. Assuming an yield of a quarter ton per acre, the additional production of pulses by crop intensification, as suggested here, would be roughly 62,500 tons per year. 433* 242

2.74 Better plant protection is another measure for getting a substantial increase in yields. It is estimated that yields increase approximately by about 10 per cent through this method. The Department of Agriculture should tackle this problem more effectively. This would only be possible by strengthening the Plant Protection Wing of the Department of Agriculture. [842]

### *Implements*

2.75 Agricultural implements in use in the State are antiquated and inefficient. The wooden plough continues to be the master implement and is used for tillage operations of almost all the crops. Iron ploughs and other tillage implements are not popular. In fact the number of iron ploughs decreased by 22 per cent during 1951–56 and at present stands at 10,225. Tractors during the same period, however, increased from 59 to 187. Irrigation pumps too have shown an increase of 116 per cent. 407

2.76 The slow adoption of improved implements is mostly due to non-availability of implements and machinery suited to local conditions as well as due to their high cost. The topographical conditions and techniques of cultivation are unique in Kerala and there are no implements designed and developed to suit such conditions. There is, therefore, need for developing efficient implements for rice cultivation, plantation crops, soil conservation work and also for specialized implements such as ridgers and earthers for ginger and tapioca. It would be necessary to have a well equipped and adequately staffed agricultural engineering station to undertake the type of work suggested here. The proposed station may also do some work in designing of irrigation aids and may advise farmers on the selection of pumping sets and cane crushers. 433* 407

### *Soil Erosion*

2.77 Soil erosion is a serious problem in Kerala. Conditions prevalent in the State such as lateritic soils, undulating to steep topography, the system of farming followed and heavy cloud burst—all these constitute towards excessive soil erosion. There is no reliable estimate regarding the extent of area affected or vulnerable to soil erosion, but it is estimated that about one-third of the cultivated area—approximately 1.5 to 2 million acres—is affected by it. It should be possible to protect at least one million acres through soil conservation measures by 1971. 134 185

2.78 Soil conservation work as carried out by the Department of Agriculture has become very popular with the farmers. The Department gives technical advice on soil conservation matters and undertakes operations in specified areas in water-shed units. [847]

134 units. Actual cost is borne by the beneficiaries because the State recovers it by easy
185 instalments. The average cost of soil conservation is Rs. 150 per acre. The total
cost of conserving one million acres at an average rate of Rs. 150 per acre would be
[464] Rs. 1.5 crores per year assuming that the programme is evenly phased. Soil conservation work is also very labour intensive and the proposed programme would give continuous employment to about 17,500 persons over the next 10-year period.

*Related Aspects*

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649 2.79 For full effectiveness, the development programme for agriculture, as suggested above, would need a larger extension organization than that which was set up in 1953. It is expected to cover the whole of the State by the middle of the Third Plan period. The extension work at present is not intensive enough. The number of extension workers is too few to be really effective; the staff capacity needs to be augmented. In this connection the Agriculture Personnel Committee has recommended that the work in charge of a village level worker should be reduced by half. The Committee has also made suggestions on other aspects such as training and education, etc., of extension workers. The State Government may examine these proposals with a view to implementation as early as possible.

*Marketing*

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438 2.80 The small cultivators generally experience great difficulty in disposing of their produce at reasonable prices. In case of some commodities like ginger, pepper and arecanut, the difference between the price received by producers and that paid by consumers is as high as 100 per cent. In addition, none of the commodities except lemon grass is properly graded and this leads to serious consequences from the point of view of export markets. Marketing, processing and grading facilities should
[656] be developed so that both the producers as well as the consumers are benefited. In this context, as recommended by the Directorate of Marketing and Inspection, all the 41 wholesale markets in the State should be regulated. At present only four are regulated.

*Agricultural Credit*

*433
452 2.81 The average level of earning of farmers being rather low, most of them require credit facilities for making improvements in their land. According to a survey, conducted in 1960 by the Bureau of Economic Studies, 89 per cent of the farmers need credit of some type. It also reveals that 82 per cent of the farmers need short term credit while medium and long term credit are needed by 56 and 34 per cent of farmers respectively. On the basis of the findings of the survey, the annual agricultural credit needs for the whole State may be put at 32.8 crores, of which Rs. 18.67 crores would be in the nature of short term credit, Rs. 6.74 crores medium term credit and Rs. 6.5 crores long term credit. The garden crops would account for Rs. 21.6 crores and paddy Rs. 11.2 crores.

2.82 Against this, the total amount distributed through organized institutions in 1958-59, was only Rs. 2.49 crores. This leaves a large gap which is probably being met by money lenders who generally charge high interest rates. Since intensive agricultural development programme as suggested here would require large amounts of working capital for the various types of farm expenses, the need for expansion of rural credit facilities through organized institutions cannot be overstressed. 433* 452

## PLANTATION CROPS

2.82 The predominant place occupied by commercial plantation crops in Kerala's agriculture, both in terms of area covered and net value contributed, has been stressed previously. In view of their importance to the Kerala economy, they deserve a high priority in the development plans of the State. The plantation crops of Kerala include pepper, cardamom, arecanunt, coconut, rubber, coffee and tea. Since most of these crops are perennial and have a time lag of 5-7 years between the stage of plantation and crop maturity, their future development programme should be viewed on the basis of a long term perspective of 20-30 years. The extension of area under these would not result in any immediate increase in output. However, quicker increases in production are possible from existing area under these crops through increase in yields per acre by the adoption of better techniques, etc. There is considerable scope for improvement in the methods of cultivation. It is thus necessary to devise, both short term and long term programmes for development of plantation crops in the State which are discussed below separately for each cash crop. 433* 241

### *Coconut*

2.83 Coconut is the most important cash crop of Kerala. Natural conditions in this State are ideal for cultivation of coconut. The crop thrives well along the sea coast and in the interior up to an altitude of 1,500 feet. Kerala accounts for about 70 per cent of the area under coconut in India and for over 80 per cent of the copra and coconut oil produced in the country. Coconut is important to the Kerala economy in a number of ways. First, the outer husk goes to support the most important cottage industry of the State, viz., coir industry. The kernel is used for edible purposes and in addition it is the mainstay of a large number of coconut oil millers. Coconut oil, in turn, forms a raw material for the soap industry. Directly and indirectly this crop provides employment to over 5 lakh persons. 433* 245 288 388 464

2.84 Coconut is not a regular plantation crop since it is not grown on large tracts as in the case of rubber, tea and coffee. It is grown in scattered patches along paddy fields, river banks, backwater stretches and in the compounds of residential houses. In view of these complexities it is difficult to estimate the precise area under coconut but rough estimates show that the area under coconut in Kerala is about 1.1 million acres. The district of Kozhikode has the highest (250,884 acres) and Palghat the lowest (11,556 acres) acreage.[1]

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[1] The figures refer to 1958-59 crop year.

*433 245 [439] 2.85 The country is deficit in the output of coconuts and annually imports about Rs. 15 crores worth of copra and coconut products. This is a heavy drain on foreign exchange resources of the country. Even after imports the total available supply of coconuts is not enough and the oil millers are, therefore, hard hit by this shortage. The demand for this commodity is increasing year after year while the production has been more or less stagnant at 3,100 million nuts. If this situation is allowed to drift unchecked, imports of coconuts will have to be increased progressively. In view of these factors, measures to increase productivity and the output of coconut are of extreme urgency.

2.86 Coconut cultivation in the State today faces a multitude of problems. The average yields are only about 40 nuts a tree per annum, that is, 3,000 nuts an acre, as against 60 to 100 nuts per tree in Philippines and some of the other Far Eastern countries. Moreover, the yield has shown no tendency to increase over the last 10 years. The focal point of coconut development programme, therefore, should be to break through the stagnant levels of productivity of coconut. The following discussion follows this line of argument.

*433 245 241 2.87 Poor yields are largely due to the absence of regular and adequate manuring. The crop needs large quantities of manure. But the farmers, majority of whom are poor, cannot afford to spend on fertilizers which in the case of coconuts show results only after two or three years. Farmers, therefore, prefer to invest whatever resources they have in manuring the field crops which bring in quicker returns. Coconuts thus get neglected. In addition to starving the coconut trees of fertilizers, many farmers grow exhaustive crops such as banana and tapioca as an understorey. This practice exhausts the soil and it needs large funds and a long period ranging from 3 to 5 years, to rehabilitate such gardens.

[647] 2.88 To raise the yields, an intensive application of fertilizers containing NPK has been recommended by the Indian Central Coconut Committee. The Committee is of the opinion that fertilizers are more suited to acidic soils on which coconut is generally grown in Kerala. It estimates the cost of requisite fertilizers to be of the order of Rs. 93 per acre per annum but that is beyond the means of a small farmer. It is, therefore, suggested that the State should arrange to advance loans for the purchase of fertilizers, and these loans may be recovered after three years. To start with, 30 per cent of the area may be brought under this programme. The annual requirement of fertilizers would be about 26,000 tons of superphosphate. The programme would cost Rs. 3 crores per year, that is, Rs. 9 crores for the first three years after which the loans may be granted out of the recoveries. The programme may be extended to cover 75 per cent of the area earmarked for coconut during the Fourth Plan. Better manuring coupled with the necessary cultural operations, can raise the yields from 40 nuts to 60 or 70 nuts per tree which would thus amount to an increase of 50 to 75 per cent over the present rate of production.

*433 245 242 2.89 Coconut crop is subject to a heavy incidence of diseases and pests. The diseases such as "leaf rot" and "root diseases" are rampant and widespread and have spread to six districts affecting over 50 per cent of the trees in the State. The annual loss of production due to these diseases is estimated at Rs. 2 to 3 crores. There is already a scheme in force to spray about 7 million trees in the infected pockets.

But mere treatment of infected trees is not enough. The healthy trees lying side by 433*
side, or trees exposed to infection, should also be sprayed as a preventive measure. 245
The proposed plant protection programme should cover the whole State in progressive 242
stages by the end of the Fourth Plan. This would cost about Rs. 5 crores during the next 10 years, but a part of this may be recovered from the farmers as spraying charges.

2.90 Coconut is mostly grown as an unirrigated crop. During the summer 433*
months they are drought-affected in many parts of the State and drought has a telling 245
effect on the trees. It is found that under irrigated conditions, the trees regularly 241
give higher yields and there is very little premature shedding of buttons. It is, therefore, suggested that the Department of Agriculture should start popularizing irrigation of coconut gardens. Filter point tube-wells and pumping sets would be suitable as means of irrigation and the State should arrange for loans on easy terms for their installation.

2.91 The average economic life of a coconut tree is about 60 years. It is estimated that over 50 per cent of the trees in the State are over 50 years old and, therefore, in about 10 years, these trees would be past their economic life. Unless immediate steps are taken to replace the aged trees, the production of nuts after a few years is bound to decline in spite of all the measures suggested so far. A campaign should, therefore, be launched to replace old trees by fresh plantings.

2.92 There is not much scope for extending the area under coconut since most of the suitable area has already been brought under the crop. This is particularly so in the former Travancore-Cochin area. However, there is some possibility of raising new coconut plantations in the interior strip of Malabar along the foot of the western ghats. The Indian Central Coconut Committee estimates this area to be of the order of 100,000 acres. It is suggested that Government should make all efforts to bring this area under coconut cultivation. There are some difficulties in the way of bringing about the extension of area, for example, lack of adequate funds with the small farmers, and their preference for rubber plantations because they do not fall within the purview of the Land Ceiling Bill, etc. Some of these hurdles could be overcome if the State offers long term loans to intending farmers for the purpose of raising fresh plantations. Assuming that loans at the rate of Rs. 1,000 per acre are distributed, the total loan fund required to plant 100,000 acres during the next decade would be around Rs. 10 crores.

2.93. Production of quality seedlings from approved stock in large numbers is 433*
also necessary for the programme of under-planting and raising new plantations. The 245
State nurseries, at present, have a capacity of 2.2 lakh seedlings a year. This capacity 654
would not be enough to meet the future needs. It is suggested that the nursery capacity should be doubled during the Third Plan by starting 15 new Government nurseries. This would require an outlay of about Rs. 600,000 during the next two Plans. However, as even these would not be able to meet the anticipated demand, private nurseries may also be encouraged to produce quality seedlings in the different regions of Kerala. As a result of the improvements suggested above, the output of coconuts may be expected to double by 1970-71.

*Tea*

*433 2.94 Tea is foremost among the exports of Kerala and the second most important
245 cash crop of the State in terms of net value contributed. It also employs the largest number of persons among the plantation crops. In 1957-58, out of the total
[439] exports worth Rs. 56 crores from the ports of Kerala, tea alone accounted for Rs. 24.3 crores.

2.95 The growth of tea plant is very much influenced by natural factors such as
[132] temperature and rainfall. A warm and moist climate with a temperature range of 55°-95°F, and an aggregate of 100 to 250 inches of well distributed rainfall are ideal conditions for the growth of tea bushes. It is grown at altitudes of over 2,000 feet above sea level and requires a well drained soil for anchorage and share of trees.
[133] The Wynad range (3,000 ft. elevation) of Malabar and Kannan Devan Hills (5,000 ft. elevation) of Travancore-Cochin area possess all these attributes.

2.96 Between 1951 and 1958 the area under tea in the State increased from 93,000 to 97,000 acres, that is, by 5.4 per cent. On the output side, the production of tea in the State during 1958 was 80.0 million lbs. as against 66.4 million lbs. in 1951, registering an increase of 35 per cent. The increase in production has thus been largely due to increase in yields between 1951 and 1958. By 1958 the yield rate reached a record level of 957 lbs. per acre. This increase has been steady and is
[171] higher than the corresponding all-India rise. However, even at present the average yield per acre in Kerala is lower than that in the case of other principal tea growing States of India such as Assam, West Bengal and Madras.

2.97 Higher prices and increased demand after the last world war gave an inducement to the planters to adopt intensive techniques of cultivation such as application of large dosage of fertilizers, better management and care. These have been primarily responsible for a larger outturn per acre. However, this trend is not likely to continue indefinitely as the bushes are getting aged. Experienced planters feel that with further improvements in cultivation techniques and increased application of fertilizer mixtures, it would be possible to raise the average yield to 1,000 lbs. per acre.

2.98 *Replantation*: The economic life of a tea bush ranges from 40 to 60 years and this makes it necessary to have a planned programme of replantation. Nearly half of the tea acreage in South India was planted during the early part of the century using Assam seeds. The remainder is the old China hybrid. Till 1953 only 0.72 per cent of the tea area had been replanted.

2.99 Replanting of tea had been neglected till recently. Most of the plantation estates were distributing the major part of their profits and there was very little ploughing back. The need for replanting on an appreciable scale received recognition only about 10 years ago but the situation has not improved still. Since no profits had been ploughed back to build up reserves, absence of replantation is largely explained by the lack of financial resources with the planters. Government aid in the form of long term loans for plantation, therefore, seems to be the only solution.
[452] The Plantation Enquiry Committee examined this problem in detail and recommended the creation of a fund for replantation. No action seems to have been taken so far.

Since this is a matter of all-India policy, the State Government should press the 433*
Central Government for an early action on this. 245

2.100 Tea estate lands are leased to growers by the Government. Most estates [427] hold lands in considerable excess of areas which actually bear tea. Government should compel the lessees to undertake planting tea in all the suitable areas ; failing this, the surplus lands may be taken back from the lessees by the Government.

2.101 A programme of replantation of at least 10,000 acres per year would be necessary during the Third and Fourth Plan periods, specially to compensate for the past neglect. Fresh leases need not be granted for this purpose as there are vast uncropped areas adjacent to tea estates in the areas already leased. Pressure, inducement, incentives in the form of replantation loans and the supply of materials may be employed to achieve the desired results. Estimates of cost of bringing an acre up to the bearing stage vary from Rs. 2,150 to Rs. 3,650 per acre. Adopting the estimate of the Tea Planters Association at Rs. 2,500 per acre, the total investment necessary to raise 10,000 acres of new plantings per year for the next 10 years would be of the order of Rs. 25 crores.

2.102 *Size of the Plantations*: In 1957, there were 282 estates in Kerala. The [423] average size of tea gardens in the State is 350 acres. However, about 50 per cent of the estates were less than 200 acres in area. For economic functioning of a tea estate, it is necessary to have a modern tea processing unit (generally known as a tea factory) attached to the garden. Different estimates show that to be an economic unit, a tea factory needs 822,000 lbs. (about 10,000 maunds) of green leaves a year and to produce this quantity anywhere from 250 to 300 acres of tea acreage would be needed. If this is accepted as a norm, it may be said that about half the tea estates in Kerala are uneconomic. This is indeed a serious problem, since the economic functioning of an estate as well as the quality of tea produced depends on the size and the type of processing machinery employed. An increase in the size of all the plantations with an area below 250 acres is necessary. Long term replantation loans and fresh leases of land, if available, are suggested as measures to correct the existing imbalance.

### *Rubber*

2.103 Kerala holds almost complete monopoly in the sphere of rubber production 433*
in the country. Kottayam has the largest concentration of rubber acreage in India. 249
During 1958, Kerala produced 22,159 tons of rubber valued at Rs. 7.69 crores, out
of a total all-India production of 25,000 tons. The rubber plantations also employ [464]
a large labour force of approximately 80,000 persons.

2.104 Soil, climate and other natural conditions found in Kerala are quite well [132] suited to the growth of rubber plants except that rainfall is not as well distributed over the year as in some other rubber growing areas of the world, such as Malaya and Ceylon. This factor has had a somewhat adverse effect on the yields, which might otherwise have been higher than the present level of 294 lbs. per acre.

2.105 During the last decade there has been a sharp increase in the area under rubber. Between 1951 and 1958 it increased by 90 per cent, that is, from 141,760

*433 acres to 270,625 acres. This is a proof of the growing popularity of rubber cultivation
249 in Kerala. Increase has also been registered in the tapped area. During 1951–56, the tapped area increased by about 50 per cent (99,120 to 150,000 acres), though the acreage under rubber increased only by 25 per cent. A higher rate of increase in case of tapped area has been caused by maturing of trees planted before 1951.

*433 2.106 *Distribution of Holdings*: The increase in the number of holdings since
249 1951 has been much more than the increase in acreage under rubber. There were
423 50,000 estates in 1958 as against 9,026 in 1951. The increase was roughly 500 per cent as against an increase in the area by about 100 per cent only. The consequence is that today rubber industry in Kerala is marked by the existence of a large number of small-size family estates. The increase in area under small estates is not a healthy trend, as these are uneconomic and have low productivity.

*433 2.107 *Production and Yields*: During 1958, the total production of rubber in
249 Kerala was 22,200 tons. The production has been steadily rising at a rate of 8.2 per cent per annum which is indeed a very high rate when compared with growth in the gross agricultural production. (Table 13)*

[171] 2.108 In 1958 the yield per acre of rubber in Kerala was 294 lbs. which is very low when compared to the yields in Malaya, Ceylon, Indonesia and other rubber growing countries. Compared to 1958, the yield in 1951 was slightly higher standing at 312 lbs. per acre. The decline in yield was partly due to the transfer of Kanyakumari district, which was a high yielding region, to Madras after the reorganization of the States. Partly it was also due to large scale new planting in all the districts except Trichur.

2.109 A significant fact about land productivity is the wide difference in yield rates between big and small estates. In 1958, the average yield of holdings of below 100 acres was only 162 lbs. per acre while in larger holdings it was 486 lbs.

*433 2.110 Low productivity in smaller gardens is due to the inefficient and unscientific
249 manner in which the estates are managed and lack of resources at the disposal of
these estate owners. Scientific and efficient management of rubber gardens requires
242 manuring of gardens, periodic renewal of fences, clearance of under-growth, control
[471] of soil erosion, etc. For carrying out these operations, it is necessary to have a large fund of working capital which the small growers do not possess. Small growers, particularly those with 10 acres and less, have very little sustaining power and cannot wait for the trees to attain maturity. Consequently, premature tappings and slaughter
[244] tappings are too common among the small estates. The small holders are also tempted to grow an understorey when the plants are young and for that they generally prefer tapioca as it is a food crop with high yields. Under cropping even when properly manured, is not good for the soil but when it is considered along with inadequate manuring, the harm can well be imagined. This type of mismanagement generally does not occur in large plantations. It is high time that something is done to improve the situation. Measures such as amalgamating small units into an economic size and working them on a cooperative basis would perhaps meet the needs. The matter should be further investigated and followed up by suitable action.

2.111 The low yield per acre is also due to the cultivation of low yielding varieties and over-ageing of trees. The Rubber Board reported that at the end of 1955, 80

*[see p. 278, category 116 -- Analyst]

per cent of over 200,000 acres planted from 1902 onwards belonged to non-selected 433*
and low yielding strains. The Board has also estimated that more than half the rubber 249
area contains trees that have outlived their economic life. Therefore, about 164,000 242
acres need immediate replantation. The total area planted till 1958 was 45,194 acres and of this replanting accounted for only 7,060 acres. To tone up the yields as well as to keep the trees in a good condition, it is necessary to replant at least 20,000 acres annually. A programme of this magnitude would need an investment of Rs. 50 crores at the rate of Rs. 2,500 per acre.

2.112 In certain well managed estates in Kerala, the yields are reported to be 433*
as high as 1,600 lbs. per acre. A large number of estates yield between 700 to 1,000 249
lbs. This shows the potentialities of raising the yields if the gardens are properly managed. There are also instances of estates, which yielded only 150 lbs. per acre, which have yielded 500 to 600 lbs. per acre after reorganization and improvement of the estates.

2.113 India is the only country in the world which is a producer and at the same 433*
time an industrial consumer of natural rubber. The indigenous production of 249
natural rubber in India at present meets about half the needs of the country, the 438
other half being met by imports. The demand for rubber is increasing at a very
fast rate and is estimated to be 55,000 tons by 1961, 82,000 tons by 1966 and 125,000 [439]
tons by 1971.[1] This means that by 1971 the demand for natural rubber would be about eight times the present level of production. It is, therefore, suggested that utmost possible effort should be put in to step up the production of natural rubber in Kerala.

2.114 Rubber production can be raised by increasing the yields as well as by 433*
extending the area under the crop. An increase in the yields is a short term measure 249
which can be realized, say, by the end of the Third Plan, provided the necessary measures are quickly implemented. Adequate annual application of fertilizer mixtures (NPK) coupled with soil conservation measures, working the soil and regulated tapping are some of the important measures that may be adopted. These measures can be undertaken more effectively and economically if the holdings are of larger size. Efforts at intensive cultivation should, therefore, be co-ordinated with increase in the size of small holdings—especially the small ones with less than 15 acres. This could be best achieved through the formation of cooperatives. The Government and the Rubber Board should initiate future development on these lines.

2.115 In addition to replantation, as suggested above, a regular plantation programme is necessary for a sustained increase in output. Raising new plantations to the extent of 300,000 acres may be suggested as the target for the next two Plans. A higher target would be only too desirable. There may, however, be some difficulties in implementing the plantation programme owing to scarcity of land. The exact scope for extension of area under rubber is not known. Various sources put the likely extent of this area to be between 2.25 lakh and 7.5 lakh acres. It is, therefore, suggested that the Department of Agriculture and Forestry should conduct a joint survey to make an accurate estimate of the extent of such land in the State. However, it is necessary to emphasise that the proposed plantations should consist of

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[1] NCAER estimates.

*433 large estates. The small holdings, as explained before, are not economical and 249 have low yields. It is, therefore, necessary to make adequate safeguards against the creation of small units.

2.116 Moreover, care should be taken to see that all future plantings are done with improved clones. This can be much better ensured if departmental planting and working of the estates by Forest Department is undertaken instead of leasing the land under Government ownership to individual growers. It may be assumed that out of 3 lakh acres of proposed plantations, 2 lakh acres would be under Government management and the rest would be planted by private growers. The programme may be phased at the rate of 30,000 acres per year. The total investment for the whole programme would thus be Rs. 75 crores.

2.117 In well-managed estates, the trees begin to yield after seven years. Assuming that the new plantings yield at an average rate of 700 lbs. of rubber per acre, the output of rubber from these would increase progressively from 9,380 tons to 37,520 tons in 1971. Full results from the proposed 3 million acres of new plantings would be visible only from 1978 onwards at the rate of additional 93,800 tons per annum.

*Pepper*

+433 2.118 The cultivation of pepper in India is almost entirely concentrated in this 244 State which produces over 95 per cent of the country's total output. During 1958 India produced about 27,000 tons of pepper, approximately 45 per cent of the overall [439] world production. Before World War II, Indonesia was the leading producer and exporter of pepper, but since then India has assumed that role. Between 1939 and 1951 production of pepper in the country increased by 16 per cent.

2.119 Large scale cultivation of pepper is confined only to the submountain tracts on or below the Western Ghats. It is also grown in the plains but as a protected garden crop in the compounds of houses and not as a plantation crop. Pepper is a perennial climbing crop and lasts for 20 to 30 years. There are on an average 300 to 400 standards (pepper bushes) per acre. On an average, each standard under plantation conditions yields 1 to 2 lbs.; but it is not uncommon to find standards in house compounds yielding even 40 to 50 lbs.

2.120 As in the case of coconut, it is difficult to arrive at a correct estimate of [659] the area under pepper. The estimate prepared by the Directorate of Statistics in Kerala is of the order of 224,658 acres for 1957-58. Of this, Malabar region accounted for 136,854 acres and the rest were in Travancore-Cochin area. The output of pepper during the same year was 26,020 tons in the whole of Kerala, of which the share of Malabar region was 42 per cent. Malabar with over 60 per cent of the area under pepper produces only 42 per cent of the output.

2.121 Per acre yield was the highest in Alleppey and Quilon (402 lbs. per acre) followed by the districts of Trichur, Ernakulam, Trivandrum and Kottayam (375 to 381 lbs. per acre). Malabar region has comparatively very low yields (180 lbs. per acre). This may, perhaps, be due to cultivation of pepper in Malabar on extensive rather than on intensive lines.

2.122 The development of pepper has not been receiving adequate attention. The crop was practically neglected during the First Plan. However, the high price of pepper which prevailed during early fifties provided a good incentive for extension of the area under pepper. The main work during the Second Plan was directed towards establishment of nurseries, extending the area under the crop and replacement of unthrifty vines with better ones. A total of 2,000 acres have been replanted so far. 433* 244

2.123 It is possible to increase the yield of pepper from the present level of above one lb. to 2 or 3 lbs. per standard through intensive cultivation, better manuring, better varieties, and plant protection measures, especially against *pollu* disease. Manuring of pepper has been a neglected field and with the application of fertilizer mixtures (3 cwts. of ammonium sulphate + 4.5 cwts. of super phosphate + 1 cwt. of muriate of potash per acre) the existing yields could be almost doubled within a year. Moreover, some extension of area under pepper vines can also take place in house compounds, as an inter-crop in small holdings and in tea and rubber plantations on land unsuited for the main crop.

2.124 Since pepper is primarily an export commodity, 75 per cent of the produce being annually sent out of India, its future scope is very much dependent on the foreign markets. After the last war, India emerged as a major exporter of pepper in the world. The USA was our largest importer, accounting for over 70 per cent of our exports. But, of late, other countries such as Indonesia, Sarawak and Malaya have begun to export larger quantities and as a consequence, the USA, now accounts for only about 20 per cent of our exports. The prices have also fallen from a peak of Rs. 4,158 per candy during 1951 to Rs. 677 in 1959. 433* 244 437

2.125 The above evidence points to an increasing degree of competitiveness in the world markets for pepper, and India is fast losing ground to the new entrants. So far India has been able to maintain the volume of exports because of large off-take by USSR and other East European countries. However, demand from these countries cannot be expected to fully compensate for the likely fall in future exports to the USA and other Western countries. It may, therefore, be seen that for maintaining the existing level of exports, not to speak of increasing it, it is essential that Indian prices should be competitive.

2.126 Prospects for internal demand, on the other hand, seem quite bright. Between 1952 and 1958, internal demand rose by about 25 per cent from a level of 5,000 tons. In view of rising population and fast developing food processing industry, future internal demand is likely to maintain this trend. 433* 244 [438]

2.127 Oleorisin, a pharmaceutical product, is extracted from pepper. A considerable amount of pepper in the western countries is used for extraction of this alkaloid. Oleorisin could be extracted in Kerala and an export trade developed out of this. This aspect needs further investigation. [278]

### *Cardamom*

2.128 Cardamom is the most expensive as well as the most delicious of all the spices. India produces about 70 per cent of the world output of cardamom. The 423* 245

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433 245 total area under cardamom in the State during 1957-58 was 69,658 acres, i.e., about 54 per cent of total acreage under the crop in India. It is grown in high ranges at altitudes varying from 2,000 to 5,000 feet under the shade of trees as an understorey. The crop requires more or less the same natural conditions for growth as pepper or tea.

2.129 Production of cardamom in the State during 1957-58 (1,242 tons of dry pods), however, was about 65 per cent of the total output of the country, which shows a higher per acre yield in Kerala than in the rest of India. Even within Kerala, 438 cultivation of cardamom is highly localized, Kottayam accounting for over 80 per cent of the area under cardamom in the State. The major cardamom growing areas in the State are: the *Cardamom Hills*, Nelliampathi, Wynad, and Vembanad.

2.130 There has been a noticeable increase in the rate of yield in Kerala during the last decade. It rose from 30 lbs. per acre in 1952 to 40 lbs. per acre in 1958. This increase has been largely due to better cultivation practices and manuring.

2.131 There was no plan for cardamom development prior to the Second Plan. During the Second Plan period research and development schemes for improvement of cardamom were initiated. It was proposed to evolve high yielding varieties and also to devise ways and means of controlling and eradicating pests and diseases which do harm to the crop. These are comparatively long term measures. To help further intensification of work on cardamom development, it is suggested that 10 additional nurseries should be established for raising and distribution of disease-free plants as well as for studying the local problems. Five to eight of these nurseries may be established in Kottayam and the rest in other cardamom growing areas. Cardamom yields could be raised by at least 100 per cent during the coming decade, provided the crop is adequately manured and reasonably protected against diseases and pests. There is a disease locally known as *Kattee* which does great damage to the crop. More vigorous steps should be taken to control and prevent this disease through intensification of efforts as well as through widening the scale of operations.

2.132 There is scope for extending the area under cardamom within the existing rubber and tea plantations, since some parts of unoccupied area in these plantations are suitable for cardamom. There are also some lands suitable for cultivation of cardamom under the jurisdiction of the Forest Department, mostly in the Silent Valley. It is suggested that the State should start cardamom plantations in such lands and, 20,000 acres may be put as the target for the area to be covered during the Third and Fourth Plans. At the rate of Rs. 200 per acre, the total investment for covering 20,000 acres with cardamom would be Rs. 40 lakhs.

### *Coffee*

2.133 Kerala is the third largest coffee producing area in the country. With 41,123 acres and 3,000 tons of output per annum in 1957-58 it accounted for about 15 per cent of the area and 17 per cent of coffee production in the country. Coffee thrives in the tropical belt lying between 25°S and 30°N of equator. It requires a 132 rainfall of 60 to 90 inches per annum with a distinct rainy and dry season and an average temperature of 70°F. The conditions required for coffee growth are present

to a considerable degree in Malabar and Nelliampathi (Travancore-Cochin) areas. 433*
The major concentration of area occurs in the Kozhikode district of Malabar. It 245
had 89 per cent of the total coffee area in the State during 1957-58. Between 1955 [438]
and 1958, coffee production in Malabar rose (18%) while that in Travancore-Cochin declined (16%). Similarly, the area under coffee during the same period registered an increase in Malabar (28.3%) but declined in Travancore-Cochin region (15.0%).

2.134 The average yield per acre of coffee in Kerala is rather low. It has been [171]
lower than the all-India average and is far below the average yield in Mysore, the principal coffee growing State in India, (1955-56 Kerala, 285 lbs. per acre; all-India, 369 lbs. per acre; and Mysore 395 lbs. per acre). Moreover, while the yields elsewhere in India, especially in Mysore, have been rising, in Kerala they have fallen from 368 to 285 lbs. per acre during 1951-58. Within Kerala, the yields are the highest in Kozhikode district which is largely due to the better management of estates in this district.

2.135 One of the characteristics of coffee plantations in Kerala is the over- 433*
whelmingly large number of small estates. In 1958, there were 14,475 registered 245
estates with a total area of 47,675 acres. Of these, 12,412 were of less than five acres 423
in size. There were only 99 estates out of 14,475 with an area over 50 acres. (Table 14)[2]

2.136 There is a distinct relationship between the size of coffee estates and the 433*
output per acre. It is noticed that yields increase progressively as the size of the 245
estates increases. The yield per acre of *Arabica* variety in estates in the size group of 5-10 acres was 0.68 cwts. per acre, while for the estates with 200 acres or more, it was 2.26 cwts. Moreover, the quality of coffee produced on small plantations is also inferior and fetches only 65 per cent of the price of coffee produced on big estates. It is difficult to ascertain the most economic size but it is believed that for effective and profitable functioning, the minimum size would be 50 acres. If this is accepted, then only less than one per cent of coffee estates in Kerala are economic. The question of making these plantations economic through consolidation or extension of area under coffee plantations should, therefore, receive serious attention. Two more points need attention. First, new areas should be planted with coffee *Arabica* rather than coffee *Robusta* since the former gives higher yields. Secondly, as in the case of tea, replantation is also over-due in the coffee plantations. Remedies on the same lines as suggested for tea hold good for coffee also.

2.137 Unlike tea, the major portion of which is exported, coffee plantations are 433*
substained largely by the demand for internal consumption. Internal demand, 245
however, has not been keeping pace with rise in the output of coffee. At present 439
India has quite a large surplus in coffee and efforts are being made to export the
surplus. In spite of an enormous surplus of coffee in South America, efforts in India [438]
have yielded good results as shown by an increase in exports from 3,000 tons in 1952-53 to 15,228 tons in 1956-57.[1] Most of our exports go to East European countries. There is scope for stepping up the exports further, in spite of the world

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[1] Source: Coffee Board, Bangalore.

[2] [see p. 279, category 11b -- Analyst]

*433 glut since the better type of plantation coffee, for which India is well known, is in
245 demand at a premium in the continental markets. At the same time internal market,
[439] about half of which is in North India is yet to be explored. This should also be
developed.

2.138 Higher production can be achieved both through higher yields and through the extension of area under coffee. Increase in cultivated area under coffee is possible by fuller utilization of the estate areas. It is estimated that there were about 21,000 acres of land at the end of 1957-58 attached to the estates which were not being utilized for coffee cultivation. These could be planted with coffee. The cost of planting coffee and bringing it to the bearing stage is about the same as that in the case of tea, that is, Rs. 2,500 per acre. The total investment required, therefore, comes to Rs. 5.2 crores, which may be provided to the growers in the form of loans and the Government and the Central Coffee Board should help farmers in securing the necessary credit. The productivity per acre can be raised to 400 lbs. per acre by better manuring, larger application of fertilizers and efficient management of the estates. Efficient management, however, could become effective only after the size of the farms has been increased to a basic minimum.

### *Cashewnut*

[258] 2.139 Cashewnut forms the main raw material for one of the major industries of Kerala. The cashewnut industry stands in importance next only to that of coir in the Kerala economy. In view of current shortage of raw nuts, which is adversely affecting the local cashew industry, measures to supplement indigenous supply are of great importance.

2.140 Cashew is grown on a wide variety of soils—ranging from coastal sandy to laterite hill top soils. It is hardy and drought-resistant but very susceptible to frost. In 1957-58, the total area under cashew in Kerala was 109,000 acres which is about 44 per cent of the total area under cashew in the country. Of this, the former Travancore-Cochin area alone accounted for over 71 per cent (77,481 acres), the rest being in the Malabar region. The production of raw cashewnuts in 1957-58 was 68,000 tons as against 54,000 tons in 1952-53, showing an increase of 26 per cent. The area under cashewnuts during the same period increased by only 1.8 per cent.

2.141 Cashewnut, at present, is rarely grown on a plantation scale. It is grown in compounds of houses, inter-spersed with coconuts, mangoes and arecanuts, and in outlying areas which are considered unsuitable for the growth of any other crop. When grown on plantation scale, about 60 to 70 trees can be planted in an acre, but it is not rare to find as many as 200 trees per acre in certain areas of Kerala. Such congestion, however, has adverse effect on output. Consequently, current yield per acre of cashewnuts (1,400 lbs. per acre) is much lower than what it could have been, had cashewnuts been grown on plantation scale. Under good conditions and in good season an acre may even yield up to one ton.

2.142 The scope for increase in the output of cashewnuts, through increase in yields or through extension of area, seems to be rather limited in Kerala. Raw nut is a low value commodity. Manuring the trees and spending on their maintenance,

therefore, does not look attractive to the growers. In addition, in some parts where 433*
rubber can be grown, cashew is being slowly replaced by rubber, the latter being 245
more profitable. Under these circumstances, since there is no incentive for farmers either to resort to intensive methods of cultivation or to extend the area under cashewnuts, it may not be possible to achieve any significant increase in their output within Kerala. There may, however, be some scope in Cannanore district, for not more than 10,000 acres. Most of this area would be on Government lands under the jurisdiction of Forest and Land Revenue Departments. It is suggested that the proposed plantation should be from clonal progenies of selected parent trees.

2.143 Assuming that 10,000 acres of land is available for cashew planting, total investment necessary to plant this area during 1961–71, at the rate of Rs. 100 per acre, would be Rs. 10 lakhs. The major extension of area under cashewnuts, however, will have to take place in the other States of India, mainly, Andhra Pradesh, Madras and Orissa.

### *Arecanut*

2.144 Arecanut is an important cash crop of Kerala. The State possesses about [423]
50 per cent of total arecanut area in the country. Arecanut is a high value as well as a labour intensive crop.

2.145 The total production of arecanut in the country is about 25 lakh maunds, which falls short of requirements by about one-third. This is made good by imports from Pakistan, Malaya and other countries. The need for conserving foreign exchange resources of India brings out the importance of increasing the production of arecanut.

2.146 Short term as well as long term measures are necessary to raise the output of arecanut. Short term measures are needed to effect a quick increase in the production. Long term measures are necessary for sustaining the gains achieved through short term measures as well as for effecting a progressive increase in the output over a longer period. Adequate manuring, irrigation, and prevention and control of [242]
diseases are some of the short term measures, while under-planting or filling in and extending area under the crop are the long term measures.

2.147 Considerable scope exists for raising the output of arecanut by providing 433*
irrigation in summer months. It is found that some of the well-managed irrigated 245
gardens yield over Rs. 6,000 worth of produce annually as against Rs. 700 to 800 in 241
unirrigated gardens. At present about 50 per cent of the arecanut area is solely dependent on monsoon rains and only about 25 per cent of the area receives adequate irrigation. Provision of irrigation facilities to arecanut gardens is, therefore, a prime necessity. Since the crop is grown scattered in the valleys and in patches on hill slopes and on small holdings, the irrigation development so far has not benefited the arecanut area to any extent. It is, therefore, suggested that the State should aid arecanut farms by granting long term loans for sinking wells and for the purchase of pumping sets. The gardens being mostly small, it may not be possible for individual garden owners to fully utilise the well and the machinery. This difficulty may perhaps be surmounted by organizing irrigation cooperatives for arecanut gardens.

*433 246 241 2.148 Manuring of arecanut gardens is grossly inadequate in Kerala. It is found that when the gardens are adequately manured and intercultured, the yields are high and there is much less of premature shedding. A combination of chemical (NPK) and organic manures has been found to give the best results. However, since arecanut is a tree crop like coconut, the benefit of manuring would accrue only from the third year of application of fertilizers. Most of the farmers are reluctant to wait for such a long time. Only cheap long term loans for manuring could bring a favourable change in attitude. In addition, as in the case of coconuts, a systematic replanting programme is also desirable.

*433 246 2.149 Knowledge regarding the scope for extension of area under arecanut is too meagre to hazard any accurate estimate of possible future planting. However, there is a feeling that the area can be increased by at least 50 per cent, most of which will be in the Malabar region. But irrigation facilities are a pre-requisite for any fresh planting. It is suggested that 25,000 acres of new areca plantations may be raised during the next 10 years. The investment required up to the bearing stage is about Rs. 1,500 per acre. Total investment on 25,000 acres of new plantation would, therefore, be Rs. 3.75 crores.

2.150 Care should, however, be taken to see that all new plantings are done with improved seedlings. In order to meet the increased seedling requirements, it is proposed that five more State nurseries, apart from the present five, should be started during the first half of the Third Plan. This would need an additional investment of about Rs. 125,000. The strength of private nurseries could also be increased from the present level of 120 to 300 by the end of the Third Plan. Development programme for arecanut can, however, succeed only if it is backed by an efficient plant protection drive since diseases and pests are very common in arecanut gardens.

## CONCLUSIONS

*433 241 2.151 The plantation sector, as a whole, faces a multitude of problems in Kerala. Some of them are specific for particular crops such as devastating diseases in the case of coconut, arecanut and pepper. But many of the problems arising on account of inadequate replantation and under-plantation, low yield rates, lack of funds with growers for replantation and new plantations, inadequate supplies of inputs especially of fertilizers, wide fluctuations in prices and export markets are common to all crops. [654] The State and Central Governments as well as the respective commodity committees or Boards are earnestly taking appropriate measures to solve many of these difficulties. Measures such as the provision of technical guidance, long term and short term loans at easy terms for replanting and manuring, export promotion, market research, compulsory gardening, and supply of improved varieties of planting material, etc., have been in operation for quite some years. The effect of these efforts, however, has not been very significant owing to inadequate size of the programme. This is particularly so with regard to loans for planting, subsidies and fertilizer allocations. The State should help in procurement of the necessary credit facilities and fertilizers, especially those containing nitrogen. It is suggested that at least a minimum of 350,000 tons

of fertilizers, 200,000 tons nitrogenous and 150,000 tons phosphatic should be 433*
allocated annually to plantation crops during the next decade. 241

*Investment and Output Implications*

2.152 It is not possible to give any exact figure for total investment needed to carry 433*
out the programmes suggested above, as a good deal of investment will be in the nature 454
of improvement of land, better agricultural techniques and shift in cropping pattern, all of which would have to be effected by the individual farmers. However, some rough estimates have been attempted here separately for the field crops and the plantation crops. On the basis of the rough estimates made for individual crops, the total public investment during 1961–71 in the agricultural sector comes to Rs. 142.3 crores, out of which Rs. 50.6 crores will be for plantations. The total private investment suggested is Rs. 185 crores, out of which Rs. 129 crores will be for plantations, and Rs. 56 crores for the other crops. The latter figure has been worked out on the basis of the ratio of private investment to public sector investment in agriculture, as given in the Draft Outline of the Third Five Year Plan of India. Total investment in agricultural sector during the coming decade, therefore, adds up to Rs. 287.3 crores.[1]

2.153 It is even more hazardous to venture an estimate of additional returns from 433*
the proposed investment. It may, however, be broadly envisaged that as a result of 241
the shift towards a more value-yielding cropping pattern as well as through increase in the physical yields and extension of area cultivable during the coming decade, the net value contributed by agricultural sector would rise by roughly 75 to 100 per cent.

2.154 The output of foodgrains is expected to increase by 16.28 lakh tons from the present level of 9 lakh tons during the coming decade. By 1960-61, the net value of agricultural output is expected to reach Rs. 174.3 crores (at 1955-56 prices). On the basis of an assumed increase of 75 to 100 per cent during 1961–71, the output from the agricultural sector at 1955-56 prices would be roughly Rs. 300-350 crores. Since the investment required for generating this increase in income has been estimated to be of the order of Rs. 327.3 crores, the marginal capital output ratio in agricultural sector during the coming decade would be between 1.9 to 2.3, depending upon actual, increase in the output of agricultural produce.

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[1] The Third Five Year Plan of Kerala, as finally approved by the Planning Commission has allotted Rs. 48.2 crores to the agricultural programmes covering agricultural production, major and minor irrigation, soil conservation, cooperation, community development, panchayats, warehousing, etc. According to NCAER calculations total public sector investment during the coming decade is envisaged to be Rs. 142.3 crores, leaving a balance of Rs. 94 crores for the Fourth Plan. If the targets laid in this Report are to be achieved, investment effort in agricultural sector during the Fourth Plan will have to be considerably stepped up.

## Chapter 3

# Animal Husbandry

23 ANIMAL HUSBANDRY IN Kerala is poorly developed. It stands in sharp contrast to the well-developed agricultural sector. With the exception of poultry, low livestock productivity marks all aspects of animal husbandry. The milk yield in the State [234] is among the lowest in the country. The total production of milk in Kerala in 1956 has been estimated at 1.82 lakh tons,[1] which works out to a per capita production of 1.3 ozs. as against the minimum of 10 ozs. per capita recommended by the Nutritional Advisory Committee of the Indian Council of Medical Research. This is also true of yield of meat from sheep and goat. Consequently, the contribution of animal [437] husbandry to the State income is comparatively low. During 1957-58 the net contribution of livestock to State income was Rs. 12.2 crores, that is, only 3.3 per cent of the State income while for all-India it was about 8 per cent.

### *Livestock Population*

231 3.2 According to the 1956 Census of livestock, Kerala had a total livestock population of 4,168,000. This consisted of 2,510,000 cattle; 4,88,000 buffaloes; 97,820 sheep; 113,711 pigs; 956,000 goats, fowls and ducks. The number of cows and she- [171] buffaloes in milk per thousand of human population was very low at 30, while the same was as high as 148 in Madhya Pradesh, 123 in Punjab, 150 in Rajasthan (all-India 80). Other major heads of livestock in the same year were sheep (97,820) and pigs (113,711).

3.3 In 1956 there were 838,000 working cattle in the State (Table 20). The significant fact about this is the high proportion of buffaloes to the total working cattle. The buffaloes constituted about one-third of the draught animals. The correspond- [492] ing all-India proportion in the same year was only 9 per cent. Buffaloes are popular in Kerala as draught animals, because of their superior draught capacity and greater suitability for the puddled type of cultivation. This has an important bearing on the formulation of the future breeding policy.

3.4 Between the Census of 1951 and 1956 the livestock population rose by over 17 per cent in the State as against only 4.8 per cent for the entire country. There has been an all round increase under all the major heads except pigs (—3.6%) and sheep [114] (—77%). A large increase in the livestock and poultry population may be partly due to a higher level of reporting in the Census of 1956 over the previous Census.

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[1] *Indian Livestock Statistics*, 1953-54 to 1955-56, Ministry of Food and Agriculture, Government of India.

But much of this increase is the consequence of a greater diversification in agricultural 231 178
activities with a view to reducing unemployment and under-employment among family 464
labour and raising the family income. Poultry-keeping has, of late, become very
popular with the rural families and it is unusual to find families in the rural areas 433*
which do not rear at least a few laying birds. Kerala produced 137 million eggs 235
(hen eggs—114 million; duck eggs—23 million) in 1951, and ranked fifth among the [369]
States in egg production. Production of eggs is now much higher and may be around
200 million. Kerala is also the biggest exporter of eggs. These are sent as far as Punjab [439]
in the north, Calcutta in the east and Bombay in the west and even to foreign countries,
mainly Ceylon.

### *Low Productivity of Livestock*

3.5 On an average a cow yields 330 lbs. of milk per year, a buffalo 619 lbs. 433*
and a goat 40 lbs. These yield rates compare very unfavourably with those for 231
other parts of India (Table 16).[2] The low productivity of animals is partly due to the [234]
poor inherent breed characteristics and partly due to the conditions under which they
are reared. The cattle found in Kerala are all of a non-descript type. They are small in size and build. They are stunted in growth. Buffalo in Kerala weighs about half of its counterpart in U.P. or Punjab. The same is true of other livestock too.

3.6 The livestock, especially the bovines, are reared under unwholesome conditions. 231
They are under-fed. The bulk of the ration consists of roughages, mostly rice straw, and is grossly deficient in proteins and other protective properties. The livestock feed available in Kerala is also highly deficient in some of the important bone-building minerals such as calcium and phosphates. This is a direct consequence of a
high rainfall which has leached off most of these minerals from the root zones of soils. [134]
In the absence of adequate phosphatic and calcium soil amendments, the crops grown in such soils are poor in these minerals. Lack of minerals has a telling effect on the health, build and general condition of the livestock of Kerala. The small size and build are important causes responsible for their low milk yield and poor work output.

3.7 Nutritional deficiencies lead to a number of serious consequences. Poor health results in low vitality and resistance to diseases as well as a low rate of nutritional utilization from feeds. All these factors are responsible for a low level of efficiency and other hazards such as a high rate of mortality and a low rate of fertility.
However, realizing the reasons for low productivity, many enlightened farmers have 231
taken to scientific rearing of livestock and have started adding concentrates, such as 232
waste grains, oil cakes and mineral mixtures to the cattle feed. Credit for this goes
to the State's Animal Husbandry Department which has been making special efforts [554]
to educate the peasantry on the need for adding mineral mixtures to the livestock feed. The Department has been distributing mineral mixtures to farmers at subsidized rates in order to popularize them.

3.8 In view of the very poor quality of livestock in the State there is an urgent 433*
need for developing animal husbandry in Kerala. Although animal husbandry 23

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[2] [Table 16, appearing on p. 282 of the text, has not been processed--Analyst]

Although animal husbandry

*433 programmes do not create any significant increase in direct employment opportunities,
23 they do help in reducing the degree of unemployment situation within the family.
[464] Moreover, some of the animal husbandry activities such as piggery, poultry-rearing, and bee-keeping need little investment to start with and are quick to yield returns.

3.9 Development of animal husbandry on commercial lines by individual rural families may not be possible without adequate State action. Aid should be given for implementing measures of improvement with a view to increasing the efficiency and productivity of the livestock. The aid could be given int he form of easy loans, development of marketing and processing facilities, sale of feed and fodder at reasonable prices, etc. These are discussed in the subsequent paragraphs separately for cattle and other livestock.

## CATTLE DEVELOPMENT

*433 3.10 The output of milk from cattle and buffaloes as well as draught capacity can
231 be improved through a scientific breeding programme and the prevention and control
232 of diseases. As stated previously, cattle found in the State are of non-descript types. Unless they are imparted with high productivity genes, any amount of improvement in feeding and rearing will not be of much use beyond a particular stage. It is, therefore, necessary to concentrate on improving the breed of cattle and buffaloes. There are two ways of tackling this problem: (*i*) selective breeding and (*ii*) mass upgrading.

3.11 The former is not feasible, as there may not be enough cattle to start with if rigid norms are employed for selection. There will also be the problem of finding suitable means of disposal of the useless cattle. The practical solution under these circumstances would be to resort to a scheme of mass upgrading according to which the local bulls are to be replaced with bulls of some outside breed, suited to local needs and conditions. To be really effective, the upgrading programme should be made to cover the entire State and should stretch over a span of at least four decades. During this period, no bulls, other than the approved ones, should be allowed to sire.

*433 3.12 The value of the upgrading programme was realized in Kerala a few decades
231 ago. The scheme was introduced on a large scale during the First Plan by starting
232 five Key Village Schemes. The number was raised to 14 in the Second Plan. It is
654 estimated that by 1965-66, it would be possible to cover about a quarter of the eligible milch cattle under the Key Village and Artificial Insemination Schemes. But even though the programme is well conceived and implemented, the NCAER team was left with the impression that the scheme had not made any significant impact in the improvement of cattle and buffalo breeds in the State. Apart from the inadequate coverage of the programme, non-elimination of the local or scrub bulls is a serious problem. For success and effectiveness of the upgrading programme, it is, therefore, necessary, first, to implement the programme intensively all over the State and secondly, competition from the local bulls should also be eliminated by compulsorily castrating all the males before they reach the fourth year of their life. These suggestions may be implemented during the Third Plan.

3.13 The Sindhi bulls which have been selected for the upgrading work in Kerala are scarce these days, and it may be difficult to procure the required number for the proposed programme. The number of bulls needed would, however, be much smaller under artificial insemination than under natural service. The former programme should, therefore, be preferred to the latter. As the State is well served with roads and has a good and efficient transport system, three or four central semen collecting centres would be needed to cover the entire State provided the product is quickly dispatched and properly stored while in transit. The centres may be located at Trivandrum, Trichur, Calicult and Palghat. Bulls should be provided for natural service in remote and out of the way places. The proposed breeding programme would need buildings, equipment and livestock for artificial insemination centres. These programmes would require an investment of Rs. 8.76 lakhs over the Third and Fourth Plan periods. 433* 231 232

*Prevention and Control of Diseases*

3.14 Prevention of diseases peculiar to livestock and a machinery for their control is a pre-requisite for proper development of animal husbandry. Under the present circumstances, where there is a heavy incidence of disease and high mortality rates, any enterprise in the field of animal husbandry is fraught with high risks; and farmers are hesitant to hazard investment on any animal husbandry business. The major share of burden will naturally have to be borne by the Government. 433* 232

3.15 For effective prevention and control of diseases, it is necessary to have an adequate number of well-staffed veterinary dispensaries and hospitals. These institutions should, as far as possible, render free treatment. Under the conditions prevailing in Kerala, it is considered necessary to have at least two veterinary hospitals in every taluk and one dispensary or first-aid clinic in every Panchayat. Measured by this norm, the existing facilities are utterly inadequate. While there are 55 taluks and 892 Panchayats in Kerala, the total number of hospitals and dispensaries,[1] at the end of 1958-59 were only 45 and 69 respectively. (Table 21)[2] 3.

3.16. Two factors are responsible for this situation: (*i*) shortage of personnel and (*ii*) paucity of funds. With the opening of the veterinary college at Trichur, the situation may be expected to improve with regard to the personnel, provided adequate funds are made available. The State should try to achieve the above norms by the end of the Fourth Plan. Investment on the proposed 20 additional hospitals and 723 dispensaries would be about Rs. 77.3 lakhs. [874]

## POULTRY DEVELOPMENT

3.17 Though Kerala has the best developed commercial poultry industry in the country, conditions under which the birds are reared are far from satisfactory. The birds are not adequately fed, and consequently they resort to scavenging. A good 433* 235

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[1] Includes Stockman's stations and Inspector's stations.

[2] In 1960 the numbers were 65 and 133 respectively.

3[see p. 285, category 116 — Analyst]

*433 235 part of poultry population still consists of the indigenous types despite the introduction of high yielding exotic breeds such as Rhode Island Reds and White Leghorns in the early thirties. The local breeds give 50 to 60 eggs a year, while the average by the White Leghorn and Rhode Island Reds in the Government farm is 186 and 172 eggs respectively.[1] This can convey some idea of the magnitude of unexploited potential in the poultry industry.

[434] [464] 3.18 Commercial poultry-rearing as a subsidiary occupation by the farmers has come to be recognized as the quickest and the easiest way of increasing farm incomes and providing employment to the under-employed. In view of these advantages, poultry industry has a special appeal in Kerala. It has been estimated by some experts that through replacement of indigenous birds with the exotic ones, the contribution from this sub-sector to the total State income could be more than doubled. This would be possible in less than five years, provided the pullets of desired types are made available to the farmers in adequate numbers at a low cost. The State should strive to achieve this by opening a large number of poultry extension centres. It is suggested that by the end of 1965-66 there should be at least one poultry extension centre in each Community Development Block. During the Third Plan, 143 additional centres may be opened and all these should work in close association with the block cooperatives. An investment of Rs. 35.75 lakhs would be needed to start the proposed centres.

3.19 Duck-rearing is done only on a small scale in the State in spite of the fact that conditions in most parts of Kerala are very well suited for commercial duck-keeping. Vast inland water resources and the abundant fauna in them is an ideal condition for large scale commercial duck-rearing. There is good demand for duck products particularly in Calcutta and Ceylon but this export potential could be developed only when the fowls are bred in sufficiently large number. It is, therefore, suggested that this potential should be fully exploited and the State should take adequate steps in the matter. In order to make the programme economical, some of the poultry development blocks may include multiplication of suitable duck breeds for distribution. Efforts may be made to select the best from the local birds and rear them for producing pullets for distribution.

### *Rearing of Goats*

*433 231 3.20 Goat-rearing under stall-fed conditions is customary in Kerala. This is quite contrary to the practice found in other parts of the country, where the goats are let out during the major part of the day for free browsing. Rearing of goats, as it is practised in Kerala, does not lead to dangers such as suppression of vegetation, crop destruction, etc.

*433 231 234 [369] 3.21 Goats are reared both for milk and meat. The average milk yield per goat is low, 40 lbs. per annum, as against the all-India average of 127 lbs. (Table 16). This is due to poor management and general malnutrition, but could be easily raised to the all-India level with improved feeding and better care. As a matter of fact it is not unusual to find goats yielding as high as 400 to 500 lbs. of milk in urban households and this is due to better management.

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[113] [1] *Administration Report of the Animal Husbandry Department*, 1957-58, Government of Kerala, 1959.

urban households and this is due to better management. Scientific goat-rearing should be encouraged in the State by educating the people about the techniques and economics of goat-rearing. For the sake of convenience and better implementation, goat development may form a part of the Key Village Programme. This would effect saving in costs and also reduce the need for additional personnel. Through this programme, the local stock can be upgraded with the desirable outside milk breeds as Bikaner or Jamunpari after studying their performance and suitability.

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*Rearing of Pigs*

3.22 Pig-rearing is not popular in Kerala, even though conditions such as climate and rainfall are favourable. The pig population has even fallen by 3.6 per cent during the period 1951–56. Piggery development did not receive any attention during the First and Second Plans and this, perhaps, is partly responsible for the decline of interest in pig-rearing in Kerala.

3.23 Pig-rearing needs to be encouraged in the State, as it is the quickest means of increasing meat production. But there has not been any research or studies on pig-rearing which could be applicable to the conditions prevailing in Kerala. It is suggested that the State should undertake research on these problems without any delay. In the meantime, this avocation may be developed on the lines suggested by the Department of Animal Husbandry for the Third Plan through the creation of piggery development blocks. In addition, the State should also provide certain facilities such as the supply of feed, provision of processing, grading, storage and marketing facilities and supply of credit on easy terms.

*Supply of Feed*

3.24 As a result of measures proposed for agricultural development, the production of cereals, pulses and oilseeds would increase by about 100 per cent during the next decade. Since livestock, especially the bovines, are fed on byproducts of agriculture (stalk, straw, husk, bran, etc.), the availability of basic feeds would also increase. Rice straw, the principal roughage in the State even may be surplus. Concentrates will, however, continue to be in deficit despite the large likely increase in the output of pulses and cereals. The situation of course, would change if oilcake, the byproduct of oil-crushing industry, is not allowed to move out of the State. This is a matter of all-India policy as the coconut oilcake is an important item that is marketed outside the State in large quantities and is even exported. Assuming, therefore, that situation regarding oilcakes does not alter, the State should do the needful towards making concentrates easily available to the farmers. This deficiency could partly be reduced by supplying concentrates (ready-to-feed mixtures) in dehydrated form. Different ready-to-feed mixtures should be evolved for cattle, poultry and other livestock. The composition and formulae for such mixtures should be worked out on the basis of nutritional experiments. In anticipation of demand for the mixtures, it is suggested that three ready-to-feed mixture factories of 200,000 tons capacity each, may be started in the State during the Third Plan.

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*433 246 3.25 The supply of succulent green fodder throughout the year also needs to be improved. The farmers should be induced to grow leguminous and perennial fodders like elephant and napier grass in the field corners or on waste lands. Distribution of seeds and cuttings to the farmers and demonstration of fodder cultivation on the fields of cultivators would go a long way in improving the production of green fodder. Municipalities and panchayats may also organize fodder farms for utilizing sewage and city compost.

*433 234 3.26 The development measures and aids proposed here, when implemented, would increase the output of animal husbandry products. Proper feeding of cattle and buffaloes can bring about an immediate increase of about 50 per cent in the production of milk.[1] Egg production may increase by over 100 per cent of the present output. Similar increases may be expected in other items too. This would give rise to the problem of suitable utilization of the additional output. Surprisingly enough, even the existing production is not being suitably utilized. For instance, even though milk output in the State is very low and there is an acute scarcity of fluid milk in the urban areas, as much as 41 per cent of the milk is processed into ghee.[2] In a State like Kerala which has a shortage of milk, it would have been more appropriate to consume the maximum possible amount of milk in a fluid state rather than in the form of milk products, since fluid milk is more wholesome and the processing of [442] milk partly destroys its vital nutritional content. This situation is due to lack of purchasing power with the rural people together with absence of facilities to market the milk in the urban areas. Since milk is a highly perishable commodity, the next best course for producers to follow in such a situation is to process it into the comparatively non-perishable ghee. But this is a wasteful process and the profits are also low.

*433 235 442 3.27 It is also gathered that 15 to 25 per cent of the total egg production in the State is wasted by breakage and spoilage due to defective and inadequate marketing facilities. Unless adequate and prompt measures are taken to remove drawbacks in the marketing system, the measures proposed here cannot be expected to yield full benefits and the producers cannot be expected to take a sustained interest in these. The solution to this problem lies in providing at least some of these facilities, the most urgent being the organization of marketing and processing facilities and services for dairy and poultry products.

## DAIRY DEVELOPMENT

*433 234 3.28 Dairy development on scientific lines is a pressing need. This was a neglected field prior to the Second Plan. During the Second Plan, however, dairy development received some attention. Two schemes for processing 150 maunds of milk per day, one each in Trivandrum and Calicut, were taken up during the Second Plan. Each

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[113] [1] *Third Five Year Plan, Draft Outline*, Government of Kerala, 1960.

[2] In 1956 the total production of milk in Kerala was 4,940 thousand maunds, of this 2,332 thousand maunds (47%) were consumed in the fluid state and 2,020 thousand maunds (41%) converted into ghee.

[113] (SOURCE: *Indian Livestock Statistics, 1953-54 to 1956-58*: Issued by the Economic and Statistical Adviser, Ministry of Food and Agriculture).

of these schemes is being expanded to handle 250 maunds per day during the Third 433* Plan. Under these schemes, milk from the surrounding villages would be collected 234 and pasteurized before bottling them for sale. The schemes will serve a two-fold purpose: (*i*) they will give incentive for a higher production of milk in the rural areas by offering fair prices and (*ii*) they will provide hygienic milk to the urban population at a reasonable price. The unscrupulous middleman will be eliminated by this process.

3.29 The dairy development programme of this type needs to be taken up on a much larger scale than at present. This is necessary to provide an outlet for the likely increase in milk production and for making hygienic fluid milk available to the urban people. Owing to acute shortage of clean and pure milk in the urban areas, milk supply schemes of the type discussed above might prove a great success. It would be good if all the urban areas with a population of over 30,000 are served with such schemes. According to 1951 Census there were 13 towns in Kerala with a population [162] exceeding 30,000. At the end of the Second Plan, 11 among these were still without any milk scheme. It is, therefore, suggested that these milk schemes should be organized in all these towns. The capacity, investment required, etc., for these schemes is given in Table 22.[2]

3.30 Many of the dairy units proposed here may find it difficult to get sufficient quantities of milk from the surrounding areas owing to the poor yield of animals and low marketable surplus with the farmers. In order to justify collection, marketing and sales organization of even the smallest size, it is considered necessary to have a handling capacity of 150 maunds per day. In case sufficient milk is not available, which is likely to be the case at least in some centres, a part of the capacity may be utilized for bottling reconstituted milk. Reconstituted milk can be of various types depending upon the fomulae. Milk powder is a common ingredient in all the types. A survey of consumer preference and tastes may be conducted before choosing the type, and part of the demand for fluid milk may be met in this way. Such a survey is essential before embarking upon the actual production of reconstituted milk because the new product may meet considerable consumer resistance in its initial stages. Propaganda and other measures to popularize the use of reconstituted milk will also have to be taken up side by side.

3.31 In smaller towns, that is, those with less than 30,000 population, cooperatives [474] for supply of milk, may be organized with consumers or producers. There were 12 such societies in 1958. These societies should be encouraged.

3.32 Munnar is a region which possesses the potential for growth into a large scale 433* commercial dairy farming centre. Many exotic cattle breeds[1] are thriving in the 231 region. The performance of some of the herds maintained by a few sterling tea 234 companies is said to be of a high order and compares favourably with that of similar herds maintained in the countries from which these cattle are imported. It is suggested that the Department of Animal Husbandry should further investigate the economic feasibility of commercial dairying in the Munnar region. If the investigation reveals prospects, the State may organize a few such dairy farms in the public

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[1] Jersey and Holstein.

[2] [Table 22, appearing on p. 286 of the text, has not been processed. - Analyst]

* 433 231 234 sector. The dairy farms may also take up the manufacture of high value items such as creamery products and *cheddar* cheese.

*Processing and Marketing of Poultry Products*

* 433 235 474 3.33 Proper disposal of poultry products is also a pressing need. At present there are a number of private as well as cooperative organizations in the Travancore-Cochin area for collecting and marketing poultry products. Some of them have even inter-State connections. These organizations have rendered satisfactory service to the poultry industry in Kerala. Credit goes to them for having developed export demand for poultry products of the State. All these organizations, however, are faced with serious limitations to further expansion and more efficient working. Their main problem is inadequate working capital. The other difficulties are: (*i*) lack of cold storage facilities, (*ii*) inadequate availability of transport aids and containers for safe transit, and (*iii*) lack of technical guidance. The State should take steps to remove these difficulties. It is suggested that the State should encourage municipalities to construct cold storage godowns. This would benefit not only the poultry industry, but also other activities such as horticulture, meat packing and fisheries. The other needs could be largely looked after by the Development Blocks. It is also suggested that the poultry cooperatives should be asked to grade eggs before marketing them.

* 433 235 439 3.34 It may not be possible to find market either inside or outside the State for all the marketable surplus in poultry products in the future. This fear is justified in view of the fact that significant development in poultry industry has taken place in some of the egg-importing States such as West Bengal, Madras, Punjab and Bombay under the Second Plan. It may, therefore, be expected that the production of eggs and other items in these States would increase considerably by the end of the Third Plan. Such a development would hit Kerala's exports adversely. In order to guard against such consequences, it is desirable that alternative means of disposal of eggs and poultry meat are planned now. The best method would be to set up a combined egg powder-cum-meat packing plant in a convenient location somewhere in the Travancore-Cochin area. The in take of the plant may be of the order of 30,000 eggs and 500 to 1,000 birds per day. The birds may be processed for preservation and packed in polyethelene bags in convenient numbers. A product like this is bound to be popular all over the country. The plant would need an investment of Rs. 3 lakhs.

* 433 23 452 3.35 Animal husbandry needs State support and help in other ways too. Loans from the State Government to both processers and cooperatives would be of a great help. The average farmer is at present unable to take to livestock-keeping as a subsidiary occupation on account of lack of funds for investment as well as for working capital. Normal farming agencies like banks and cooperatives do not serve them because of their non-credit worthiness and the uncertain nature of livestock business. Seeking the help of local money-lenders would be too expensive for these ventures. Only the State can solve the problem of rural credit in a situation of this type by making available larger *takavi* funds, arranging for loans through banks and cooperatives, by agreeing to share the risks, etc.

## INVESTMENT ESTIMATES

3.36 It is not possible to give the exact extent of investment that would be needed 433*
to implement the measures suggested here as the major part of investment would be in 23
the nature of improvement in the rearing conditions, erection of broods, purchase of
livestock, poultry, etc., which have to be undertaken by individual farmers themselves. 654
The public sector component of total investment for the programmes suggested in the 464
above pages comes to Rs. 2.7 crores. The major schemes for improvement of cattle, etc., and the likely public sector investment on these is given below:

| | Rs. lakhs |
|---|---|
| Breeding programme | 6.76 |
| Veterinary aid | 77.30 |
| Poultry Extension Centres | 35.75 |
| Dairies (milk-processing units) | 145.00 |
| Egg powder factory | 3.00 |
| TOTAL | 267.81 |

3.37 Assuming roughly that the proportion between private and public sector investment in the sphere of animal husbandry is the same as in the agricultural sector, private investment by farmers for improvement of livestock and poultry may be taken to be Rs. 3.5 crores. On this basis total investment, therefore, would add up to Rs. 6 crores during the coming decade.

3.38 As a result of the above schemes, it is estimated that milk production will 433*
go up by approximately 50 per cent while egg production may even double itself. 234
Output of milk may, therefore, be expected to be 2·73 lakh tons and that of eggs [235]
400 million by 1970-71. NCAER's population projections estimate the population of [161]
Kerala in 1970-71 to be 20.12 million. Consumption of milk by the end of the Fourth Plan is, therefore, likely to be about 2 ozs. per head, if the above measures are effectively implemented.

[text continued on p. 67]

[P.66]

MAP 8

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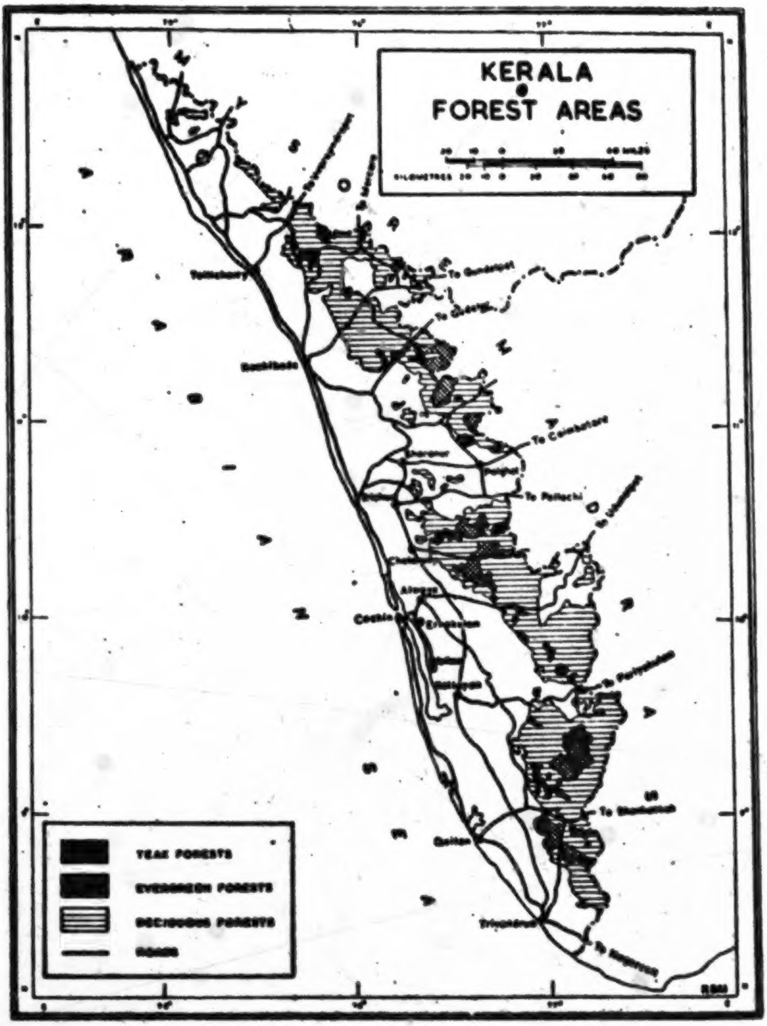
103
137
491


KERALA
FOREST AREAS
MILES
KILOMETRES
Tellicherry
To Gundalpet
To Coorg
Kozhikode
To Coimbatore
Shoranur
Palghat
To Pollachi
Cochin
Ernakulam
Kottayam
To Periyakulam
To Shencottah
Quilon
Trivandrum
TEAK FORESTS
EVERGREEN FORESTS
DECIDUOUS FORESTS
ROADS
RBM

# Chapter 4

## Forests

Forests rank among the key resources of Kerala. Estimates of the area under 137
forests differ widely. According to the Revenue Department figures, the area under 311
forests is 24.58 lakh acres, that is, 26.2 per cent of the total area of Kerala. According
to the Forest Department, the area under its jurisdiction is 22.28 lakh acres.
Private forests account for another 4.80 lakh acres thus giving a total forest area of
27.08 lakh acres (30 % of the total area). Whichever be the correct figure, it is
clear that the proportion of area occupied by forests is much higher in Kerala than
the average for the whole of India (17.2%).

4.2 Apart from the importance of forests as a source of raw material for the 137
industry, and timber for other uses, forests have a moderating effect on the climate and
act as a vegetal cover protecting the soil from erosion. The position in Kerala is
quite satisfactory in respect of the protective function of forests. A large number of [245]
perennial tree crops like coconut, arecanut, cashewnut and rubber are also grown in
the State. Their effectiveness in protection of the soil and influence on climate is
as great as in the case of the forests. These perennial crops, therefore, act as a useful
subsidiary to the actual forest growth.

4.3 The quality of forest growth of Kerala is also of a very high order. During 313
1955-56, forests contributed Rs. 5 crores,[1] that is, 1.4 per cent of the State income, 434
which is almost double the all-India average (0.7%). Per acre yield of forests is also
higher in Kerala. Whereas it was Rs. 5.6 per acre on an average for India, it
was as high as Rs. 18 per acre in Kerala during 1955-56. Employment potential of 313
forests, however, is quite meagre in relation to the area they occupy. Forests in 464
Kerala employed only 19,000 workers, that is, 0.35 per cent of the total working
force ( all-India 0.4 % ). Forests generally require only a few hands to work
as the maintenance staff and as labour for extraction and logging.

### *Type of Forests and their Regional Distribution*

4.4 The high yield and the large variety of important commercial species grown in 137
the State are a consequence of the climatic and topographical features of the State. 132
Kerala gets the benefit of south-west as well as north-east monsoons. As a result of
these, the State is well assured of a good rainfall which, in addition, is fairly well

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[1] Appendix 2 explains the method of calculation.

137 132 distributed over the year. The high degree of rainfall, old geological formation and maritime climate have largely been responsible for the luxuriant forest growth in Kerala. Trees get the full benefit of moisture, depth of soil and protection from frost and drought. For these reasons, forests in Kerala also possess the advantage of a long growing season.

137 311 4.5 Most of the forest area lies in the high ranges on the eastern border of the State and in the area adjacent to these. Only a few strips are found in the coastal plain. The forest area is, however, distributed over all the districts of the State. Since the forests run across the whole of eastern border while the districts in the State occur almost longitudinally, all districts, except Alleppey have a good proportion of their area under forests. The districts of Quilon and Trichur have as high as 45.2 per cent and 45.1 per cent respectively of their area under forests. (Table 23)[1]

137 4.6 The wide variations in climatic and topographical conditions in the State have resulted in a large variety of forests. With the exception of the desert, the truly temperate and the alpine types, all classes of forests are found in Kerala. In addition to the natural forests, Kerala has also got artificial plantations of valuable species. The State has been a pioneer in this sphere.

4.7 Among the natural forests, deciduous forests comprise 80 per cent of the growth. The rest is of the evergreen type. The evergreens are found mostly in the higher ranges above a height of 2,500 feet since they require a cool climate for their growth. The various types of forests found in the State are given below:

(1) *Evergreen Type*

(*a*) Southern tropical wet evergreen forests,
(*b*) Southern tropical semi-evergreen forests,
(*c*) Mountain wet sub-tropical evergreen forests, and
(*d*) The temperate Shola-Grasslands.

(2) *Deciduous Type*

(*a*) Southern tropical wet Deciduous forests and
(*b*) Tropical dry Deciduous Forests.

3/3 322 4.8 Among the evergreen types, most of the species are utilized in the manufacture of plywood and packing cases, which is a flourishing industry in the State. Pali Kulamavn and Vellapine are some of the well known plywood species. Anjali, which is used for boat-building and mahagony utilized for furniture, are two other important economic species found among the evergreens. Of late, a number of other evergreen species have sprung into prominence and are now finding economic uses. Since markets for these are growing, it is planned to extract these newer species also on a commercial scale.

4.9 Teak and rosewood are the most important species found among the deciduous forests. Vanteak, Rosewood, Poola and Charopine are some of the other important species belonging to this category. These species are chiefly useful in making furniture and in building and construction work. A detailed list of the trees and other major produce found in Kerala along with their present uses is given in Appendix 5.[2] A list of minor produce is given in Appendix 6.[3]

[1] [Table 23, appearing on p. 286 of the text, has not been processed--An.]

[2], [3] [see pp. 329-333, category 11b --Analyst]

*Artificial Plantations*

4.10 As mentioned already, in addition to the natural forests, Kerala also ranks high among the Indian States in respect of artificially raised plantations of valuable species. In fact the teak plantations were first raised in Nilambur as far back as 1842. The planting work had been regularly carried out with the result that there were about 75,000 acres under this species at the end of 1959. 245

4.11 Although Kerala can claim to have been a pioneer in the matter of teak plantations, a beginning with the other plantations has been made only very recently with the onset of the era of planning in the State. During the First Plan period forestry could be paid little attention. Effective beginning may, therefore, be said to have been made only during the Second Plan. Some of the plantations which have been recently started in the State are:

(i) *Cashewnut plantations*: Covering an area of 1,100 acres.
(ii) *Softwood plantations*: An area of 9,220 acres had been covered by the end of the Second Plan.
(iii) *Wattle plantations*: A beginning for raising this very valuable tanbark tree has been made recently in the Hamilton Plateau of the Devicolam range.
(iv) *Eucalyptus grandis*: Plantations of this species were started in the high ranges in Peermade and Munnar and have been showing very encouraging results. They form the raw materials for making pulp, which is used for manufacturing newsprint and rayon.

It will thus be seen that Kerala has made considerable progress in its plantation programmes and leads the other States, especially in respect of its teak plantations.

*Forest Produce—Its Extraction and Utilization*

4.12 Total quantity of major forest produce extracted from the forests of Kerala during 1958-59 through Government Agency as well as through purchasers is given below: 313

MAJOR FOREST PRODUCE EXTRACTED FROM KERALA, 1958-59

| | *Government Agency (cu. feet)* | *Purchasers* |
|---|---|---|
| Rough logs | 3,950,567 | 5,06,079 c.ft. |
| Rough poles | 410,202 | 1,088 c.ft. |
| Sawn and Squared timber | 144,802 | — |
| Fuel | 22,791 | 25,576 tons |
| Miscellaneous | 1,626 | Rs. 1,224,460 worth |

The gross revenue through actual sales amounted to Rs. 2.44 crores and royalties on coupes sold to purchasers earned another Rs. 0.64 crores. 434

4.13 Extraction and stocking in the depots are undertaken by contractors but the actual disposal is done departmentally by means of auction. Standing coupes are also

3/3 sold to purchasers for extraction of major forest produce but the extent of this is very limited in Kerala, Whereas for the whole of India about 75 per cent of major forest produce is extracted by the purchasers, in Kerala only about 15 per cent of forest is extracted by the purchasers directly, the rest being entrusted to departmental extraction.

[432] 4.14 The procedure in case of sale of timber and poles is to offer them first to the Government Departments and to sell only the surplus by open auction. The result is that while the Government Departments are able to obtain timber at reasonable negotiated rates, the trade obtains timber at very heavy rates.

4.15 In case of firewood, Messrs Forest Industries (Travancore) Ltd. (F.I.T.) have been given a concession for extraction of firewood for supply to M/s Fertilizer and Chemicals (Travancore) Ltd., Alwaye. The latter are now switching on to oil and, therefore, other uses shall have to be found for firewood extracted by the F.I.T. whose concession has still to run a number of years. Firewood supplies to the main cities come from the forest coupes which are sold to purchasers in auction after extraction of the timber. No area is managed purely for raising firewood as in some other States of India.

4.16 Unlike the major forest produce whose removal is done mainly through the Government agency, extraction of minor forest produce is mostly done through the [651] purchasers. As may be seen from Appendix 6 Government earned only Rs. 50,000 as revenue through sale of minor produce while it earned about Rs. 5 lakhs in the form of royalties from purchasers.

*Silvicultural Systems*

3/3 655 4.17 Kerala is unique in having working plans for all the Government owned forest areas in the State. Since all the Government forests are managed under the latest scientific systems, there is hardly any danger of over-felling in the public sector forests.

4.18 With a wide variety of forests, both natural and artificial, the systems of silviculture practised are suited to the types. The Selection System[1] is the one that is being applied in all the evergreen forests and only the trees of little economic importance are extracted under the simple felling rules. The complex nature of the vegetation and difficulty of regeneration of evergreen species, together with the danger of heavy wild growth have caused these forests to be worked under the Selection System.

4.19 In the other timber forests clear-felling with natural regeneration, supplemented by artificial planting, is being undertaken. The climate and soil conditions are so favourable that there is generally no difficulty in obtaining natural regeneration. The only exception, and it is quite an important one, exists in case of the evergreen forests which are being worked more and more heavily as demand for new species arises in the market. Their regeneration is not keeping pace with the removals.

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[1]. Under the Selection System trees are selected for felling uniformly all over the forest. Under simple felling rules patches of forests are completely cleared in rotation irrespective of age, type or growth of trees contained in that patch.

## SOME FORESTRY PROBLEMS

### *Acquisition of Private Forests*

4.20 It has been mentioned that forests of Kerala are one of the best managed ones. 313 But this is true only of the reserved forests under Government jurisdiction. In the Malabar area there are about 5 lakh acres of private forests which are maintained [423] very unsatisfactorily. Unlike the reserved forests, there is no adequate protective staff for the care of these forests and no attention is paid to their regeneration or management on scientific lines. This has naturally resulted in an unwarranted depletion of forest wealth in the private forest areas. In the interests of adequate preservation of forest wealth, immediate steps are necessary to acquire the private forests and bring them within unified forest management under the control of the Forest Department. A provision for acquiring the private forests was made during the Second Plan but their acquisition could not be carried out. This must be effected during the Third Plan period.

### *The Problem of Encroachment*

4.21 There is one other disquitening feature about forests in Kerala. Such is 137 the pressure of population in the State that inroads are being made into the forest 311 areas, especially where forests occur in the midland region. This has taken the form of Government deforestation of forest areas in the interests of Grow More Food Campaign. In addition, there have also been illicit encroachments and these areas are still under cultivation, although the State Government have declared them to be revertible. The extent of these areas is not very large compared to the total area under forests. About 9,750 acres fall within the former category and 16,500 acres belong to the category of revertible areas. The gravity of the encroachment situation arises from the fact that in case a lenient view is taken, these will prove a serious menace to proper maintenance of forest potential in the long run.

### *Regeneration of Evergreen Forests*

4.22 The problems referred to above were of an administrative nature; but 313 forestry in Kerala is faced with one or two urgent technical problems as well. One of these is to find out some way of inducing adequate regeneration of the evergreen species.

4.23 Of late a number of evergreen species have found new uses in the manufacture of plywood logs, railway sleepers, telegraph poles, etc., and these species have all come into prominence. Full potential of the existing evergreen forests cannot, however, be tapped since their natural regeneration takes time. The forest department has, therefore, got to keep control over the working of these forests.

4.24 In case of some species because of difficulties connected with regeneration, there has been a shortage of supply. The problem of regeneration of these forests is intimately connected with the problem of light. Regeneration requires light to

313 [654] be so regulated as not to disturb the present symbiosis between the plant species present. Intensive research is, therefore, urgently required to find ways and means of inducing adequate regeneration of the evergreen forests. There are at present two research stations in the State at Malayathur and Nilambur. The location of a third station in the evergreen forest areas is recommended.

*Eupatorium*

137 [654] 4.25 A problem that has been engaging the attention of the Forest Department is that of the weed eupatorium. It got introduced into the State from Assam at the end of the Second World War by some ex-service men who had served in Assam. The weed has spread like wild fire throughout the State and has become a serious menace. Recent research carried out by a biochemist in Trivandrum has found a use for this shrub in the manufacture of fertilizers. Further research may be carried out to find its fruitful uses.

*Tribals*

*433 162 464 [245] 4.26 A few tribes reside within the forest areas. They are allowed free grazing rights and privileges of cultivation, free of assessment. However, this does not provide them with a full-time occupation. On the other hand, it is not possible to arrange for their migration to midland or the coastal region because of the high pressure of population which exists in these areas. It has, therefore, been suggested in this Report, that two labour colonies should be formed in grass land *sholas* where large scale planting of *Eucalyptus Grandis* is taking place. This labour force could later be employed in the proposed newsprint mills when they come up.

## RECENT DEVELOPMENTS

*433 313 654 4.27 During the First Plan period there was no forest development scheme. A beginning in forest development programmes was made only during the Second Plan. An amount of Rs. 1.24 crores out of a total Plan outlay of Rs. 87 crores was earmarked for forest development plans in the Second Plan period. By the end of 1959, however, only Rs. 21.68 lakhs had been spent. The shortfall arose mainly on account of two items. The largest single item among forestry was acquisition of private forests in Malabar and for this Rs. 40.95 lakhs had been allotted. Due to procedural difficulties, this could not be undertaken and only Rs. 0.34 lakhs had been spent by the end of 1959. Secondly, although the progress of cashewnut afforestation programmes in terms of physical target has been statisfactory, as can be seen from Table 24,[1] the cost of afforestation programmes at Rs. 24 lakhs was an over-estimate. Actual performance has been possible within Rs. 4.81 lakhs.

4.28 Table 24 gives the Plan provision and progress in execution of various schemes upto the end of 1959. Overall progress has been slow, except in the raising of plantations where the Department hopes to achieve all the targets. The slow progress

[1] [Table 24, appearing on p.287 of the text, has not been processed. – Analyst]

in the early years has been due to the fact that either the sanctions from the Government 433* were received late or the staff was not appointed in time. The shortfall in performance 213 during the Second Plan period emphasises the need for devoting greater attention to 654 forest development programmes during the Third Plan period.

## FUTURE DEVELOPMENT OF FORESTRY

4.29 Forests are an important source of raw material for industry in Kerala. 438* Their importance is brought out by the fact that forest-based industries are more 313 predominant in the economy of Kerala compared to the position they occupy in the industrial structure of India as a whole.[1]

4.30 In view of the important position occupied by the forest-based industries in Kerala, the policy towards forest resources should aim at long-run enhancement of the forest potential so that an increasing surplus of raw materials could be made available to industry. Forest development policy in the State should, therefore, be guided by the following objectives :

- (*i*) Utilization of resources as yet untapped.
- (*ii*) Raising the long-run forest potential through:
  - (*a*) acceleration of the process of conversion of poor deciduous forests into valuable teak and softwood plantations.
  - (*b*) extensive reclamation of grasslands on the basis of experimental Eucalyptus plantings carried out during the Second Plan.
- (*iii*) Incorporation of technical improvements in the methods of logging, etc., so that wastage could be reduced. These aspects are discussed in the following paragraphs.

*Existing Potential*

4.31 In Kerala, the existing potential of forest resources is being exploited comparatively much better than in many other States of India. Due to easy accessibility provided by the numerous rivers and roads, many of which serve the forests, extraction has been very much facilitated. The importance of the role of river transport in exploitation of forest wealth is shown by the fact that two big centres of forest produce, viz., Kallai and Chalakudy are both located by the side of rivers. Although the general picture as regards exploitation of existing resources is quite bright, some pockets still remain untapped. These are discussed below : [505] [438]

4.32 (*i*) *Bamboo Resources* : In spite of a large bamboo potential in the State, this source remains completely unutilized for industrial purposes. Out of the total available supply, about two-thirds is utilized for local requirements of construction, etc. The position regarding the quantum of surplus available is as follows.

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[1] See Chapter on Industries.

*433
313
[423]
[438]

### AVAILABILITY OF SURPLUS BAMBOO RESOURCES

| *Name of Division* | *Government Forests* | | *Private Forests* | |
|---|---|---|---|---|
| | *Area in acres* | *Field in tons of air-dry bamboos* | *Area in acres* | *Field in tons of air-dry bamboos* |
| Wynad | 18,667 | 38,347 | .. | .. |
| Kozhikode | 20,045 | 61,479 | 14,733 | 32,391 |
| Nilambur | 18,865 | 46,336 | 20,988 | 24,015 |
| Palaghat | 3,090 | 8,634 | 2,890 | 5,386 |
| Nemmara | 6,800 | 18,054 | 25,460 | 81,361 |
| *Total* | *67,467* | *172,878* | *64,100* | *143,353* |

SOURCE: Department of Forests, Kerala.

[384] 4.33 Out of the above surplus, it was recently agreed to supply 1,60,000 tons to M/s Gwalior Rayons for setting up a Rayon factory. They have also been promised an additional 1,00,000 tons when the factory is in full production. The latter amount could only be made available after the private forests have been acquired by the Government. No extraction has so far been started owing to the flowering that has taken place over a wide area in the forests.

4.34 On the basis of the above estimate of available and committed supplies, there still remains a balance of about 56,000 tons which could be utilized as raw material for paper manufacture. However, the paper mill project can be undertaken only after full regeneration in the flowered areas has taken place.[1]

4.35 During this interval it would be advisable to undertake surveys of other bamboo-bearing areas in the Travancore-Cochin area. At the same time efforts should be made to divert a part of bamboo at present being utilized for local requirements to industry. Far too high a proportion (about 66%) is being utilized for non-industrial uses.

313 289 4.36 (ii) *Eta Reed Resources* : The two reeds *Ochlandra travancorica* and *Ochlandra Rheedi* occur in forests of the State. These reeds are at present being supplied under a concession granted to Punalur Paper Mills Ltd. The reeds in these coupes flowered from 1953–57 and, consequently, the Punalur Mill is getting only about 5,000 tons of reeds from the allotted coupes against their annual requirements of 25,000 tons of green reeds. After full generation takes place in the flowered area, the available supply of eta reeds would be roughly 50,000 tons. The surplus of 25,000 tons may by utilized by the Punalur Paper Mills which is planning to double its present capacity during the Third Plan.

*433 314 4.37 (iii) *Minor Forest Produce* : A large number of medicinal plants exist in the State. But the potential is hardly being utilized. Against a gross revenue of Rs. 3.1 crores from the forests, minor forest produce was responsible for only Rs. 5.2 lakhs, that is, 1.7 per cent. This is unlike the neighbouring States of Mysore and Madras where minor forest produce contributed a substantial part of the revenue. A phyto-chemical plant is being set up at Neriamangalam. It will require a large number of items of minor forest produce. It is, therefore, suggested that a proper survey of the forest areas should be conducted to assess the extent of minor forest products available in the State. This will bring out the raw material potentialities for the phyto-chemical industry as well as other small scale industries which could be based on the minor forest produce of the State. 433* 314

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[1] Further details of a paper factory are discussed in the Chapter on Industries.

*Raising the Long-run Forest Potential*

4.38 There is not much scope in Kerala for extension of area under forests through afforestation programmes. There are already a number of competing claimants for land use. The proportion of area under protective vegetal cover, as discussed, is also quite adequate in Kerala. What is necessary is to minimize the extent of further in-roads into forest areas by clear felling for cultivation, etc. 433* 313 [311]

4.39 Having ruled out large scale afforestation as a means of improving the forest resources, the only other possible methods, to augment the forest pontential are improvement in forest management and raising of new commercial plantations. Forests under the jurisdiction of the Forest Department are already being managed on scientific lines. The primary need, therefore, is the acquisition of private forests so that the standards of management could be enforced uniformly throughout the State. [655]

## COMMERCIAL PLANTATIONS

*Teak*

4.40 In addition to the existing 75,000 acres under teak, there are 640,000 additional acres of low quality deciduous forests which are suitable for conversion into the valuable teak plantations. This changeover will considerably improve productivity of the deciduous belt. About 9,000 to 10,000 acres can be taken up every year against 2,000 to 2,500 acres being planted annually at present. The technique of raising these plantations has been perfected in Kerala and the present agri-silvicultural method, whereby the plantations are raised free of any cost to the State, may be continued. 433* 245

*Rosewood*

4.41 Rosewood is in great demand by the furniture industry. Logs of over 72" girth are also exported, mostly to Italy. The supply is getting exhausted and it is desirable to replenish the stock by raising new plantations. The tree is slow growing. It is, therefore, proposed that it should generally be raised on the periphery of the teak plantations where it can be left to grow for 2 or 3 teak rotations. There should be no extra cost as the plantations are to be raised along with teak by the agri-silvicultural method. [439]

*Softwood Plantations*

4.42 As a result of the difficulties in the way of regeneration of evergreen forests, the softwood species grown in these forests are in short supply. By the end of the x

433 245 Second Plan, 9,220 acres had been covered by artificial plantations of these species. In view of the current shortage, it is proposed that another 45,000 acres be added to these plantations. 3,000 acres out of these may be kept apart for the matchwood species.

### *Sandalwood Plantations*

[438] 4.43 During the Third Plan period, it is proposed to take up 1,000 acres of this plantation at Nachivayal, Marayr, and Maunanthura, in the Devicolom range. The general prospects for sandalwood in the State are not very bright but if some additional suitable areas could be located, they may be taken up for plantation during the Fourth Plan period.

### *Bamboo Plantations*

4.44 The existing resources (para 4.32) are largely being consumed for local uses leaving only one-third of the overall supply as surplus for industrial utilization. In order to augment the existing supplies, it is proposed to raise Burma bamboo over an area of 1,000 acres during the Third Plan, by under-planting it in teak plantations in Nilambur area. During the Fourth Plan another 2,000 acres may be taken up.

## PLANTATIONS OF FAST-GROWING SPECIES

4.45 So far, the trend of thinking has favoured an emphasis on the growth of plantations of hardwood species like teak and rosewood which find a ready demand but have got a long rotation period. Attention has only recently been focussed on the fast-growing species. In view of the growing pace of industrialization and the consequent steep rise in demand for forest materials, it would be desirable to supplement the long rotation species with fast-growing types which give the yields much more quickly. The three main species of this type which can be grown in Kerala are *Eucalyptus Grandis*, cashewnut and wattle.

4.46 The whole of the area under *shola* grass is suitable for conversion into *Eucalyptus Grandis* and wattle plantations. The productivity of these grasslands will be very much enhanced if these economic species are planted there. The success which has already attended the planting of eucalyptus promises a bright future for this species. These plantations can be extended over 25,000 acres during the next 10 years. The State Government proposes an allocation of Rs. 75 lakhs for the purpose of raising this plantation during the Third Plan period. The economic importance of eucalyptus plantations arises from the fact that they form the raw material for mechanical pulp and rayon industry.

4.47 The seeds for these plantations were first obtained from Australia. It is suggested that the advice of an Eucalyptologist may be sought through the Colombo Plan and the State officers may also be sent to Australia for training. This will help in perfecting the technique of raising these valuable plantations all over the grasslands in the State..

4.48 Compared to the eucalyptus plantations, the area over which wattle can 433* grow is rather limited. This tree can only grow in the high ranges at elevations 245. above 4,000 feet. The Hamilton Plateau in the Devicolom range is a suitable locality and there is a proposal to afforest, 5,200 acres during the Third Plan. The cost of afforestation is between Rs. 120 to Rs. 150 per acre. This plantation would supply the raw material for wattle bark extract industry. There does not appear to be much scope for extension of area under this species after the Third Plan period.

4.49 As these plantations are to be raised in the high ranges, it will be desirable to establish regular labour colonies and employ labour on a more or less permanent basis. Some agricultural occupation will also have to be provided to the labour force. It is, therefore, proposed that the establishment of regular forest villages in [168] the grasslands should be seriously considered by the Government. They will also provide the much needed labour for raising and upkeep of the plantations and later for manning the newsprint mills which will be established at the end of 10 years. The exact employment potential is difficult to work out but it is estimated that the plantations will be able to support about 500 families, each family providing two able-bodied workers.

4.50 Cashewnut trees can be raised in the barren forest areas which are considered unsuitable for any other type of forest growth. In Trichur and Malayathur divisions, where these plantations are located, there are further tracts of barren unproductive reserves. Attempts at raising useful forest species having failed, these areas may be put under cashewnut plantations. If Malabar forests are acquired promptly, another 5,000 acres could be planted with cashewnuts during the next decade.

4.51 The technique of cashewnut afforestation is still in an experimental stage, but the highest success obtained so far has been with dribbling seed to a depth of 3 inches at a spacing of 30 ft. × 30 ft. which gives 49 plants per acre. Plantations raised at a spacing of 18 ft. × 18 ft. (125 trees per acre) have also given good results. Experiments on spacing should continue and the optimum spacing in different types of soil may be determined. The cost has been worked out at Rs. 35 per acre plus another Rs. 5 per acre as establishment charges.

### *Rubber Plantations*

4.52 Rubber is one of the chief plantation crops of Kerala. The present area 433* under rubber is roughly 2:5 lakh acres. Since rubber plantations provide a valuable 249 raw material and a good source of employment in the primary sector, it is proposed to raise rubber plantations over a fairly large area of secondary forests. So far as protective functions of a forest area is concerned, this would be a change for the better, as areas under rubber are better protected than a forest and trespasses are not allowed. Other aspects of the problem are discussed in the Chapter 2 on Agriculture and Plantations.

4.53 The targets for additional acreage to be brought under different type of 433* plantations, discussed above and the figures for investment required are summarized 245

*433 245 in the following table :

| *Type of Plantation* | *Third Plan* |  | *Fourth Plan* |  | *Fifth Plan* |  |
|---|---|---|---|---|---|---|
|  | *Physical targets* (acres) | *Financial targets* (Rs. lakhs) | *Physical targets* (acres) | *Financial targets* (Rs. lakhs) | *Physical targets* (acres) | *Financial targets* (Rs. lakhs) |
| Teak | 20,000 | 15.0 | 40,000 | 30.0 | 60,000 | 45.0 |
| Softwood | 15,000 | 15.0 | 30,000 | 30.0 | 50,000 | 50.0 |
| Grassland Sholas[a] (Eucalyptus grandis) | 10,000 | 75.0 | 15,000 | 102.5 | — | — |
| Burma Bamboo[b] | 1,000 | 0.5 | 2,000 | 1.0 | 3,000 | 1.5 |
| Cashewnut | 1,000 | 0.5 | 2,000 | 1.0 | 3,000 | 1.5 |
| Casurina and Matchwood on Coastal Perrumbavur | 1,000 | 2.0 | 2,000 | 4.0 | 3,000 | 6.0 |
| Wattle | 5,200 | 7.8 | — | — | — | — |
| TOTAL | 53,200 | 115.8 | 91,000 | 168.0 | 119,000 | 104.0 |

[a] All grassland sholas would be afforested by the end of the Fourth Plan.

[b] Most of these plantations in the Fourth and Fifth Plans will be in the private forests acquired in Malabar.

## SOME TECHNICAL IMPROVEMENTS

*433 313 4.54 The existing logging techniques and modes of extraction entail a lot of wastage of timber. Since there is a general shortage of timber, supply of timber from the forest areas could be enhanced by incorporating some of the improvements disscussed below.

### *Proper Seasoning Facilities*

4.55 A large amount of timber at present goes waste or is used as fuel. This could be more economically utilized if proper seasoning and preservation facilities are introduced. Seasoning and preservation plants should be encouraged in all areas where there is a concentration of saw mills. This would make possible utilization of a large variety of secondary timber through upgrading them and making them commercially profitable. Government departmental rules may have to be modified to insist on the use of seasoned timber in place of the more valuable teak timber in all Government construction works.

### *Better Logging Techniques*

4.56 The present methods of logging need to be mechanized, especially as a good network of roads exists through which mechanical saws, etc., can be taken to the actual coupes. The techniques currently employed are antiquated and involve a lot of wastage. With improved techniques, the extent of wastage could be reduced. [231] The extraction of timber by elephants in Malabar should be continued as it has proved to be cheap and quite efficient.

*Forest Roads*

4.57 Although in respect of overall position regarding forest roads, Kerala is comparatively better off and accessibility is quite good, there are some remote areas for which new roads are required. Opening up of these areas through forest roads would permit tapping of certain pockets of forest resources uptil now lying untapped. Some of these important roads which have been suggested for being taken up during the Third Plan are :
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(*a*) *Roads from Dhon to Palamalai*—to tap the Chenat Nair reserved forests and to make Palamalai a summer resort.

(*b*) *Extension of the Silent Valley roads to the borders of the Nilgiris district*—to tap the rich resources of the Silent Valley reserved forest and the improvement of its existing natural regeneration.

(*c*) *Construction of a road from Nelliampathy Parambikulam Tellikkal.* This will make Sungam and Parambikulam Ranges accessible through the Kerala territory only. At present, the State has to depend on the goodwill of the Madras Forest Department for the extraction of forest produces.

The cost of constructing these roads is estimated to be Rs. 50 lakhs.

*Training Facilities*

4.58 The programme for raising forest plantations can be implemented smoothly only if there is adequately trained personnel to deal with the several technical problems. At present the staff is generally deputed to Forest Colleges at Dehra Dun and Coimbatore for training. These colleges cannot, however, meet the requirements of training lower grade staff. It is, therefore, suggested that in view of the importance of forestry to Kerala, this State should have a separate training institute of its own. This institute, may be located at Peechi.
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*Resource Survey*

4.59 For proper planning of forest-based industries, the exact extent of availability and location of different types of forest resources should be known. In the past, development has been impeded by industries being allotted more areas than was warranted by their capacity. This has thwarted development of other industries which could have utilized the surplus raw material from the forest coupes. These defects can be remedied only if a full inventory of forest resources is available. Uptil now only a survey of bamboo areas has been carried out. During the Third Plan a full resource survey should be carried out.
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## ESTABLISHMENT REQUIRED FOR THE DEVELOPMENTS PROPOSED

4.60 If the development programmes proposed in this report are to be carried out, strengthening of the Forest Department will be necessary. Appointment of
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two more Conservators of Forest, one to deal with general development works of the State and the other for the new plantations may be considered. It is also proposed that an additional Chief Conservator of Forests to cope with the heavy work may be appointed as soon as the tempo of development work has gained momentum, say, by the middle of the Third Plan period. The Territorial Divisional Forest Officers should each be given a gazetted assistant to deal with all the development works in their divisions. The present annual expenditure on Establishment amounts to Rs. 8.23 lakhs (1958-59). If the above suggestions are accepted there should be an increase of about 25 per cent. It is also expected that if the tempo of developments is maintained, higher amounts will be needed in the Fourth Plan. The establishment expenditure is, therefore, worked out as under :

| | |
|---|---|
| Third Plan period | Rs. 10.29 lakhs annually. |
| Fourth Plan period | Rs. 10.97 lakhs annually. |

## INVESTMENT AND OUTPUT IMPLICATIONS

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4.61 The major part of investment during the coming decade will be on raising the various commercial plantations discussed above. Investment on other items is summarized in Table appearing under Para 4.53. The amount of Rs. 3 crores[1] which is expected to be spent during the Third Plan period on acquisition of private forests, does not appear in the investment figures since the amount is only in the nature of a monetary transfer.

4.62 As a result of the development programmes suggested above, output contributed by the forests may be envisaged to increase from the following sources during the coming decade :

(1) Sale of forest produce from areas clear-felled for teak plantations. This item will be quite substantial.

(2) Income from thinning of teak plantations.

(3) Income from bamboo and eta reed resources, which will start accruing by the end of the Third Plan period when all the flowered areas would have been regenerated.

(4) Income from other plantations would start accruing only towards the end of the coming decade or during the beginning of the Fifth Plan since gestation period before the plantations start maturing is rather long.

4.63 It is difficult to give an exact forecast but taking the above factors into account, the increase in income accruing from forestry during the coming decade is taken to be as follows. It is assumed that income at the end of the Second Plan, that is, during 1960-61 would be 10 per cent higher than that in 1955-56, in 1965-66 twenty per cent higher than that in 1955-56 and by 1970-71 it would be one and a half times the income in 1955-56. On this basis projections for State income from forestry would be as follows :

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[1] The Third Plan has allotted Rs. 3.75 crores for Forest Development which compares quite favourably with investment suggested by us. However, it has to be kept in mind that our figure does not include finances for acquiring private forests, which the State Plan has to provide for.

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| | Rs. crores |
|---|---|
| 1955-56 | 5.0 |
| 1960-61 | 5.5 |
| 1965-66 | 6.0 |
| 1970-71 | 7.5 |

4.64 It will be noticed that in the earlier period income is projected to grow at a lower rate than towards the end of the period. This is naturally to be expected in view of the fact that gestation period for growth of forest potential is rather long and the effects of the development programmes will start becoming visible only towards the end of the Fourth Plan period and during the Fifth Plan period. During the Second and Third Plan periods rise in income is expected only from clear felling areas for teak plantations and intermediate felling in the older areas.

## Chapter 5

## Fisheries

*433 226 KERALA IS THE leading fish producing State in India. Its present production of fish amounts to about 310,000 tons. Maharashtra comes next with an output of 210,000 tons. Over 80 per cent (260,000 tons) of the fish landings are obtained from the sea and the rest from inland sources. About 75,000 tons of fish (70,000 tons cured and 5,000 tons fresh) are at present annually exported to other parts of the country, and 2,000 tons (frozen and canned) are sent abroad. Allowing for a very negligible import, the net quantity available for local use comes to 235,000 tons per annum.

262 [171] 5.2 Fish eating is popular in this State. About four-fifths of the population are accustomed to taking fish regularly. At present the per capita consumption of fish in the State is 41.30 lbs. per year for the fish eating population and 33.00 lbs. per year for the total population, as against 9.50 lbs. and 6.10 lbs. respectively for India as a whole.

*433 226 [464] [511] [434] [592] 5.3 About 85,000 persons (1.60 % of total labour force) are directly engaged in fishing activities and they produce a net output of Rs. 5.60 crores (1.60 % of State income). The standard of living of an average fisherman in Kerala is very depressed. The average annual income of a fisherman's household in Kerala, consisting of 6.40 members, is estimated at Rs. 542, or only Rs. 85 per fisherman, that is, about one-third of the average per capita income in the State.

### PRESENT STATUS OF FISHERIES

*Marine Fisheries*

5.4 *Coastal Fisheries*: Although Kerala has a comparatively short coastline (10% of all-India) Kerala ranks first in the production of marine fish (about 30% of all-India Production—Table 25).‡ Large marine fish catch can probably be attributed to the much more intensive fishing effort made in Kerala. In 1957, the ratio of man-hours per mile of coastline came to about five times the average for other States. This heavy fishing pressure is paralleled by the high pressure of population on land, leading to an intensive use of the natural resources. Intensive fishing is not only confined to the number of hours of fishing put in, but it also includes the use of more efficient methods. It will be seen from Table 26‡ that the catch per man-hour of fishing in Kerala compares favourably with that in the other States.

‡, ‡ [Tables 25 + 26, appearing on p. 288, have not been processed -- Ana]

5.5 The average annual landing of marine (coastal) fish is estimated at 260,000 433*
tons (35% of the all-India output) and the gross value of marine catches at 226
Rs. 6.5 crores.

5.6 The catches from coastal waters comprise such commercially important species of fish as Sardines (20%), Prawns (13%), Mackerel (11%), Sharks (5%), Silver-
bellies (4%), Horse Mackerel (4%), Sole (3%) and Ribbon fish (3%). According [262]
to a sample survey conducted by the ICAR in Travancore-Cochin area, about 61 per cent of the total landings are consumed in fresh condition and the remaining part is utilized in various fish-based industries. (An alternative estimate by the State Fisheries Department puts the ratio as fifty-fifty.)

5.7 Dug-out, plank-built canoes and catamarans are the main types of crafts [501]
employed for fishing. Dug-out canoes are more popular throughout the State. Boat
seines, gill nets, lines and hooks, coast nets and shore seines are the important tackle [227]
used in Kerala. Drift nets are used for catching Sardines, Mackerels and Sharks while long lines are sometimes employed for exploiting Horse Mackerels and Shark fisheries.

5.8 During the last decade efforts have been made to introduce mechanized 433*
fishing in order to raise the outturn and improve per capita income of the fishermen. 226
Experiments for mechanizing indigenous boats and introducing suitable new types of 177
mechanized crafts have been carried out in the State with the help of FAO experts and
the Indo-Norwegian Project. However, unlike Maharashtra, Kerala has made very 501
little progresss in mechanizing its fishing activity. This is mainly explained by the fact that the indigenous crafts in use in Kerala at present, have been found unsuitable for the installation of engines. Thus, to introduce mechanized boats, new boats have to be designed and constructed. As a result of a number of investigations and trials, a few small mechanized boats, ranging from 20 to 26 feet in length, have been recently introduced in the State. The Indo-Norwegian Project has so far issued 88 mechanized boats to the fishermen who completed training with the project. In addition to
these, the State Fisheries Department has also issued 39 mechanized vessels. Of [654]
these, 25 have been issued to fishermen; of the rest, some are operated by the Department at training centres for transportation of fish and some still remain idle.

5.9 In Kerala, as in some other marine States of India, mechanized boats are [894]
issued at subsidized rates to fishermen's cooperatives, groups of fishermen and to [474]
trainees who have been trained at one of the two Training Centres in the State. The [654]
quantum of subsidies is in line with the all-India pattern, that is, 50 per cent of the cost of engine, 25 per cent of the cost of hull and 33⅓ per cent on that of fishing nets and gears.[1]

5.10 The Indo-Norwegian Project is playing an important role in the develop- 433*
ment of fisheries in Kerala. The project aims at the improvement of socio-economic 226
conditions of the fishermen. The programme envisages an increase in the produc- 654
tion of fish as well as the earnings of the fishermen, improved handling and distribution of catches, the promotion of cooperative activities, and better sanitation and living conditions in the fishermen's villages. The project has also undertaken the supply of fish to the interior areas of the State. It provides most of the basic requirements of

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[1] The Indo-Norwegian Project issued nets and gear on 80 per cent and hull and engine on 50 per cent subsidy in the beginning.

*433 226 654 the fishing industry, owns a boat-building yard, a workshop, a cold storage and refrigeration plant and runs a training centre. The fishing villages are thus being developed into what may be called Integrated Fishing Centres.

228 654 5.11 *Off-shore Fishing*: An attempt to introduce exploratory and commercial off-shore fishing operations from Cochin port was made by the Travancore-Cochin Government as early as in 1940. A Government sponsored private company operated three large-sized (65 feet to 90 feet) vessels for a time. But these operations proved abortive and were given up owing to lack of trained crew and absence of docking and repairing facilities. Thorough exploratory investigations have been on for the last few years, and at present deep-sea fishing is being carried on jointly by the Government of India and the Indo-Norwegian Project.

226 [438] 5.12 *Chank Fisheries*: With the transfer of some areas of Travancore-Cochin to Madras at the time of the reorganization of States, Kerala has lost some of its important chank fishing centres along the Kanyakumari coast, and only a few centres of lesser importance, Thekkay Kollencode, Poovar, Pulinkudi, Poonthura, Shankumugham [479] and Veri are now left with the State. The right of collection of chanks is annually auctioned on royalty basis, preference being given to cooperatives. The number of [434] chanks collected and the money realized by the cooperatives in 1957-58 and 1958-59 were 26,629 chanks (for Rs. 16,361) and 18,355 chanks (for Rs. 9,177.50) respectively.

### *Inland Fisheries*

*433 226 5.13 Estuaries, backwaters and adjacent low-lying fields, rivers and canals, ponds, tanks and reservoirs comprise the inland fisheries of Kerala. According to the State Fisheries Department, the total production from these sources is at present about 50,000 tons per annum. This represents only 20 per cent of the total fish production [171] in the State. The inland fish production of Kerala, though much lower than that of West Bengal (12,000 tons), compares favourably with that of Madras (40,000 tons).

### *Estuaries and Backwater Fisheries*

[133] [103] [221] 5.14 The more important rivers opening directly into the sea and having permanent link with it are the Periyar, Bharatpuzha, Beypore, Billiapatam and Korapuzha. Regular fishing in the estuaries is done only during the south-west monsoon period (end of May to beginning of August) when fishing activities in the sea, owing to rough weather, are almost at a standstill. The estuarine catches include such varieties as Mullets, Milk Fish, Prawns of different types and Horse Mackerel.

[133] [438] 5.15 The backwaters of Kerala covering approximately an area of about 300 square miles, are the most important source of inland fish production. The main areas are Ashtamudy, the Kayamkulam and the Vembanad, all situated in the Southern part of the State. The production from estuaries and backwaters is estimated by the State Fisheries Department at about 46,000 tons per annum. Prawns constitute the bulk of the catch which comprises, in addition to Prawns, Mullets, Bekti, Horse Mackerel and Engraulis.

5.16 Chinese nets and stake-nets are the most important type of tackles used in the backwaters. There are about 1,180 Chinese nets and 5,400 stake-nets operating in the State. These nets are registered on payment of an annual licence fee assessed on them. 227 [651]

5.17 A large area of low lying paddy fields adjacent to the backwaters is used for prawn culture. The whole area is enclosed with earthern embankments (5 to 6 feet high) provided with sluice boxes for regulating the flow of water. Prawn culture in paddy fields is done on an extensive scale in Ernakulam and Trichur districts. Cultivation in these fields is restricted to a single crop lasting from July to September. The fishing operations in these fields extend from October upto the middle of April. Fishing is done with bag nets, scoop nets and drag nets. The fields are grouped into three classes on the basis of productivity. The average yields per square mile per annum from I, II and III Class are estimated at 1,080 lbs., 680 lbs. and 330 lbs. respectively. The area under the three classes are shown in Table 26. 433* 228 [212] [221]

5.18 About 80 per cent of the catches consist of prawns. On a modest estimate, the total production of prawns from these fields would be of the order of 4,000 tons. The rest of the catch consists of Mullets, Pearlspot, etc. Most of the prawns caught from the fields are cured and exported to the other States in India, Burma and Ceylon. [832]

5.19 There are three brackish water fish farms in the State, one each at Mallapuram, Narakal and Ayiramthenga. The individual areas of these farms are 52.5, 42.5 and 22 acres respectively. An additional area of 28 acres is being converted into a farm at Ayiramthenga. Two more farms with a total area of 64 acres are also to be established.

*River Fisheries.*

5.20 The river fisheries in Kerala are very poorly developed. Out of some 44 rivers traversing the State, only four, viz., Bharathapuzha, Periyar, Pamba and Beypore are more than 100 miles long. The more important fresh-water fish belong to the *Barbus* and Cat fish species. 433* 226 [133]

5.21 There is no systematic fishing in the rivers and only a small number of fishermen are dependent on riverine fisheries. Fishing in the rivers is taken up as a hobby by the local people and the catches are utilized for domestic consumption. No data on production and the number of persons engaged are available in regard to river fisheries. [523]

*Culture Fisheries*

5.22 There are a number of tanks, ponds and reservoirs in Kerala, covering an area of about 6,000 acres, However, the area suitable for fish culture is much less than this. A recent survey of culture fisheries shows that only about 260 acres out of a total area of 1,227 acres surveyed in Trivandrun, Quilon and Alleppey districts are suitable for fish culture. 433* 228

*433 224 5.23 One of the reasons for the poor development of culture fisheries is the absence of suitable species of fish in the State. However, organized fish culture in fresh waters has been introduced recently. The varieties of fish stocked are Pearlspot, Tilapia, Mullets, all collected locally and major carps obtained from Madras, Andhra Pradesh and West Bengal.

## DEVELOPMENT PROSPECTS OF FISHERIES

*433 226 5.24 Fisheries hold a prominent place in the economy of Kerala. Their basic importance arises on account of three factors (*i*) in a food deficit State like that of Kerala, the shortfall in the local output of paddy can be counter-balanced to a large extent by increased consumption of fish. Being rich in proteins, they can form a valuable supplement to tapioca which is deficient in protein. In fact, a combination of rice, tapioca and fish can form a well balanced diet; (*ii*) some of the important species found in Kerala, e.g., prawns and shrimps are very good foreign exchange earners; and (*iii*) in addition, fishing is a source of livelihood for a large section of the population. The object of fishery development programmes should be to aim at a progressive increase in the catch of fish with a view to promote its consumption within the State as well as to enhance the foreign exchange earnings through the export of Prawns and the other valuable species.

### *Marine Fisheries*

*433 228 5.25 Considerable scope exists for the development of marine fisheries in the State. For increasing production from off-shore waters more trawlers and other large vessels will have to be operated. While production from the coastal waters could be raised substantially by operating mechanized boats, more trawlers and other vessels will be necessary for increasing the catch from off-shore waters. Introduction of mechanized boats would call for the provision of adequate docking and navigational facilities.

### *Off-shore Fisheries*

5.26 The potentialities of the off-shore fisheries are yet to be determined. Some of the richest Prawn grounds of the world are located off Kerala coast, and Prawns caught there are of excellent quality. Besides Prawns, fairly large quantities of other valuable species are also caught in the off-shore waters. It may, therefore, be useful to undertake shrimp and purse-sienning. It will also be desirable to operate one or two vessels for Tuna fishing on an experimental basis. Tuna is at present landed in small quantities, but it is believed that there are good prospects of large catches in the off-shore and more distant waters. Since both bull-trawling and other trawling have proved almost equally successful in the Kerala waters, it will be desirable to continue and enlarge these operations further.

5.27 The fishing pressure in the off-shore waters of Kerala is at present negligible. Judging by the intensity of fishing in many other parts of the world, it seems likely that the addition of about 35 trawlers, 50 medium-sized boats and one or two Tuna boats may not have any adverse effect on the resources. However, it is advisable to proceed cautiously in this matter. It is, therefore, suggested that during the next five years only 15 trawlers, 20 medium-sized boats and one Tuna boat be put into operation. If the suggested operations prove successful, the number of off-shore fishing vessels can be increased by another 20 trawlers, 30 medium-sized boats and a few Tuna boats during the Fourth Plan.

5.28 For the present trawlers like Japanese bull-trawlers operating in the off-shore waters of Maharashtra may be employed in Kerala too. The cost of such a trawler with the necessary gear and equipment including navigational and fish finding aids is expected to be Rs. 500,000. The investment in the Third Plan period, for putting into operation 15 such trawlers will be about Rs. 75 lakhs.

5.29 It is expected that the total landing of each of the proposed trawlers will not be less than 700 tons per annum. On account of large proportion of prawns and other quality fishes landed by the off-shore fishing vessels, the value of the catch of a trawler may be estimated at Rs. 210,000 and that of the 15 trawlers about Rs. 30 lakhs.

5.30 For shrimp trawling, purse-seinning and gile netting, medium-sized boats of 50 to 60 feet in overall length, fitted with 80 to 100 H.P. engines may be suitable. A Tuna boat may have to be 120 feet or more in length with a gross tonnage of 250-300. The capital cost of 20 medium-sized boats and a Tuna boat would be about Rs. 45 lakhs. On a rough estimate, the catches would come up to 3,000 tons valued at about Rs. 9 lakhs. The total capital cost for all the vessels would thus be Rs. 1.2 crores, and the anticipated additional annual production by the end of the Third Plan about 12,000 tons valued at Rs. 39 lakhs. The additional investment for the new vessels proposed for the Fourth Plan would come to Rs. 1.75 crores, and the additional production by the end of 1970-71 to about 19,000 tons valued at Rs. 57 lakhs. Thus, the total capital cost of developing the off-shore fisheries during the next decade would be about Rs. 2.95 crores and the total annual additional production would be of the order of 32,000 tons, valued at Rs. 96 lakhs. A total crew of about 850 will be necessary.

5.31 As far as possible commercial off-shore fishing should be undertaken by private companies in collaboration with foreign fishing interests. Such collaboration will not only save the foreign exchange necessary for the purchase of the fishing vessels, gears and other equipment, but it would also provide valuable opportunities for the training of Indian personnel.

### *Coastal Fisheries*

5.32 Introduction of mechanized fishing in the State would substantially increase the output from coastal fisheries. In addition, encouraging results are expected from a more extensive use of improved fishing gear. Mechanization of fishing will require several ancillary facilities like berthing, landing, preservation, marketing, etc. A 22 feet mechanized boat yields about 60 per cent and a 25 feet boat about 110 per cent larger catch as compared with the catch by non-mechanized boats.

*433 228 435 154 5.33 The introduction of about 1,600 mechanized boats during the next decade is not likely to subject Kerala's fishing grounds to undue pressure. A beginning may be made with 600 such boats during the Third Plan. The cost of a new mechanized boat (engine, fishing gear and equipment) would be about Rs. 29,000. It is desirable to continue with the present pattern of financial help to the fishermen for boats and gears in the form of loans and subsidies for some time to come.[1] A subsidized mechanized boat would cost about Rs. 19,000. This amount should be advanced to the fishermen by the Government as a long-term loan. On this basis, the total capital cost of putting 1,600 mechanized boats into operation during the next 10 years will be of the order of Rs. 4.64 crores (Rs. 1.76 crores as subsidy and Rs. 2.88 crores as loan). The consequential annual production is expected to be of the order of 30,000 tons by the end of the Third Plan, and 80,000 tons by the end of the Fourth Plan. The value of the additional production of 80,000 tons will be Rs. 2 crores.

*433 228 5.34 These mechanized boats should be operated from a select number of Integrated Fisheries Development Centres, each centre being provided with such basic facilities for the fishing industry as the supply of oils and lubricants, refrigeration, processing, etc. The establishment of a number of such Integrated Centres should be the utilimate aim. The Indo-Norwegian Project has already developed an Integrated Centre at Neendakara. About 15 of these centres may be established during the next two Plans. Among other places, Quilon, Alleppey, Cochin, Azhikode, Ponnani, Beypore, Tellichery, Cannanore and Balliapatam would provide good sites for developing such centres.

5.35 The introduction of 1,600 mechanized boats will create employment opportunities directly for about 6,400 fishermen. In order to obviate the unemployment situation, the Government may undertake a programme of supplying about 6,000 indigenous boats which will create employment for about 22,000 fishermen by the end of the Fourth Plan. The average cost of an indigenous boat with the necessary gear would be Rs. 2,000 (Rs. 1,000 for the craft and an equivalent amount for the gear). A subsidy of 25 per cent on the cost of the boat and another 33⅓ per cent on the cost of gear may be given to the fishermen. The total capital cost on 6,000 boats would be about Rs. 1.2 crores. The additional catch from these indigenous boats is expected to be of the order of 60,000 tons per annum by the end of 1970-71, valued at Rs. 1.5 crores.

5.36 The existing boats can increase their catches considerably if they are provided with better fishing gear. At present there are about 22,000 indigenous crafts in the coastal waters of Kerala. Initially, at least a third of these boats should be supplied with better gear. The cost of such a programme would be about Rs. 85 lakhs. At the present rate of subsidy of 33⅓ per cent, the Government's share in this cost will be Rs. 28 lakhs. An additional production of 25,000 tons of fish valued at Rs. 62.5 lakhs may be expected by the end of the Fourth Plan.

5.37 Thus, the development of coastal fisheries would entail a total investment of about Rs. 7 crores, of which Rs. 3 crores would be required during the Third Plan. As a result of this investment, an additional annual production of 80,000 tons valued at Rs. 2 crores may be expected by 1965-66 and of 165,000 tons valued at Rs. 4.6 crores by 1970-71.

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[1] A subsidy of 50 per cent is given on the cost of engine, 25 per cent on that of hull, and 33⅓ per cent on that of gear and tackle.

## INLAND FISHERIES

### *Estuarine and Backwater Fisheries*

5.38 The catch of fish from the backwaters could be increased considerably by establishing fish farms on a large scale. Out of the 300 square miles of backwaters, the area that can be profitably converted into fish farms is not known. It is however, believed that it will not be difficult to develop about 15 square miles of this area.

5.39 Areas close to the entrance to the sea can be partly reclaimed by putting up embankments and then converted into fish farms. The fish tanks thus formed can be filled with water from the sea at high tides through channels fitted with sluice and wire gauze shutters. It would be desirable to encourage the private fish farmers and their cooperatives to take up this work on a large scale with the help of Government loans and subsidies. The total initial capital cost for this purpose will be of the order of Rs. 1 crore, of which Rs. 50 lakhs will be required during the Third Plan. The yield per acre of the existing fish farms is about 250 lbs. per annum. But with proper stocking of suitable species, the yield can be raised to 400 lbs. per acre. On this basis, the total output from 15 square miles would be of the order of 1,800 tons valued at Rs. 9 lakhs by the end of the Fourth Plan.

### *Reservoir Fisheries*

5.40 Reservoir fisheries in Kerala also have scope for development. Since the wild stocks comprise mostly cat fish, minor carp and other uneconomic varieties, the reservoirs will have to be stocked intensively with fingerlings of more valuable species. At present there are about 15,000 acres of reservoirs available for fish culture, and an additional area of the same order is likely to become available during the Third Plan. In view of the existing dearth of fish seed, an area of not more than 23.16 square miles may be intensively stocked during the Third Plan. This may be raised to 46.32 square miles by the end of the Fourth Plan. The annual fish seed requirement for stocking 23.16 square miles by the end of the Third Plan will be of the order of 15 millions, increasing to 30 millions by the end of the Fourth Plan. A number of fish seed farms where induced breeding can be undertaken, will have to be established with facilities for rearing the seed into fingerlings. The capital cost of such farms and of five vehicles for transporting the fish seed, etc., would be about Rs. 12 lakhs, half of which could be implemented in the Third Plan. The total annual production of fish from 30,000 acres of reservoirs is expected to be of the order of 2,000 tons, valued at Rs. 9 lakhs.

5.41 Although fish seed production and the stock and management of reservoirs would be the responsibility of the State Fisheries Department, their exploitation should

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be entrusted to Fishermen's Cooperatives. This can be done either on lease or on royalty basis. The Department should, however, provide the necessary technical guidance for exploitation work.

5.42 Effective exploitation of the reservoirs may present some problems on account of the depth of water and presence of obstrcutions at the bottom. In reservoirs still under construction or planned for the future, all the obstructions like tree stumps, boulders, etc., should be removed before the water is impounded.

## GENERAL MEASURES

5.43 An increase in the output of fish or for that matter of any other commodity is not an end in itself. Adequate measures have to be taken to distribute these to the final consumers. A proper distribution system assumes a much greater importance in case of a perishable commodity like fish. The three important aspects of the distribution system viz., refrigeration, transport and marketing are discussed in what follows.

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### *Refrigeration*

5.44 The provision of adequate refrigeration facilities is important for the preservation and marketing of fish. The present production of ice in Kerala is about 100 tons. The bulk of this production is consumed in restaurants and other similar establishments ; the quantity available for the fishery industry is far from adequate. The State Fisheries Department has established four ice and cold storage plants, two of them having ice and cold storage equipment only, and the remaining two having freezing facilities as well. In addition to these, the State Fisheries Department has a freezing plant at Vizhinjom. The Indo-Norwegian Project also runs an ice plant, and the ice produced there is utilized for the marketing of fish undertaken by the Project as well as by the fishermen of the Project area. Nearly 814 tons of ice were produced at this plant in 1958-59. Two more ice plants, one each at Chowghat and Azhikode, with a capacity of 5 tons of ice per day and ice and storage capacity of about 40 tons, are expected to be established shortly.

5.45 The existing refrigeration facilities in Kerala will have to be expanded considerably during the Third and Fourth Plans. It will be desirable to set up ice and cold storage plants at all production centres, especially at the proposed Integrated Fisheries Development Centres, where the bulk of the sea fish will be landed. Important consumption centres like Kottayam, Trivandrum, etc., will also require these facilities. It is estimated that about 10 ice and cold storage plants will be required during the Third Plan and another 15 during the Fourth Plan. The total capital expenditure for the installation of these 25 ice and cold storage plants will be of the order of Rs. 75 lakhs of which about Rs. 30 lakhs will be in the Third Plan. It is worthwhile considering the grant of some subsidy to the prospective operators for the installation of such plants. Cooperative societies should also be encouraged to set up and operate these plants.

*Transport*

5.46 The entire coastline of Kerala is well served by the railways. From Trivan- 489
drum to Kayankulam and from Tirur to Manjeswar, a total distance of 220 miles, the 439
tracks are only two to three miles from the sea coast. In addition, there is a motorable [496]
road running almost all along the entire coastline. Head loads, bicycles, motor [491]
lorries, all these modes are employed for the transportation of fish to the markets de-
pending on the distance of the landing sites from the consuming centres.

5.47 The State Fisheries Department operates four insulated vans. In addition, 438
the Department operates two insulated carrier boats, one from Cochin and the other 494
from Azhikode. These boats transport iced-fish through the inland waters to the in- 605
terior places. For the marketing of fish in the interior areas, the Indo-Norwegian
Project operates eight refrigerated vans.

5.48 It is estimated that the State will require about 60 road vehicles and 20 433*
carrier vessels during the next 10 years. The capital expenditure on these is expected 438
to be about Rs. 40 lakhs, of which Rs. 15 lakhs would be required during the Third 489
Plan. The trucks and carrier vessels should, as far as possible, be owned and operated by Fishermen's Cooperative Societies. Expansion of insulated wagon facilities on the railways will be equally necessary. Insulated wagons should be provided on routes connecting the major production centres with the consumption centres.

*Marketing*.

5.49 The marketing of fish in Kerala is not well organized. At present it is con-
trolled by a few moneylenders and fish merchants. The fishermen are very poor and 442
have generally to depend on borrowings during the off season. A departmental survey [235]
reveals that in 1958 the fishermen in Kerala had total assets of only about Rs. 30 lakhs [426]
against a total debt of Rs. 135 lakhs. Only a small percentage of the fishermen in [471]
Kerala own the boats and nets they use. Most of them work as employees under few
boat-owner fishermen. In the pay-off period the boat-owner advances small [465]
amounts to the fishermen for their day-to-day needs. The catch is auctioned at the [437]
landing centres. The bidders include the fish curers, the retailers and lorry owners,
who generally supply fish to the retailers.

5.50 Fish prices fluctuate considerably even in the course of the day. Fish is [435]
never weighed in the market. They are measured by standards such as heap, basket, [804]
and number, and these vary from market to market. The important wholesale fish [366]
markets in the State are located at Trivandrum, Kottayam, Tonur, Trichur, Kozhi-
kode, Alwaye, Changanacherry and Athirumpuzha. [103]

5.51 Changanacherry, Athirumpuzha and Vaniyankulam are the most important [366]
markets for cured and salted fish. In the coastal areas the consumption of dried fish [251]
is confined mostly to the off-season when fishing totally stops. In the interior of the
State, owing to lack of transport facilities, cured fish is sold for the major part of the [262]
year. The State has a number of retail fish markets, every town or a group of villages 443
having at least one. 366

5.52 Fish marketing in Kerala requires a great deal of improvement, both 433*
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*433 organizational and physical. Most of the fish markets lack such facilities as adequate
442 supply of water, drainage, proper flooring, wire screen, etc. Clean and hygienic con-
443 ditions for the sale of fish should be created in all the consumption centres. A number of retail and wholesale fish markets should be built at all the major consumption centres. Twenty of these markets may be a good target for the next decade. Provision of fish storage facilities, by way of small refrigerated cabinets is also necessary in retail marketing. The capital cost for building these new markets and providing the storage cabinets would be about Rs. 20 lakhs of which Rs. 8 lakhs may be under the Third Plan. In order to ensure reasonable return to the fishermen it is imperative that cooperative marketing of fish should be expanded as much as possible.

*Servicing of Marine Engines*

*433 5.53 The programme envisaged for mechanized fishing will call for adequate
504 servicing and overhauling facilities. The Integrated Fisheries Development Centres, where most of the mechanized boats will be concentrated, should have properly equipped servicing stations. At least three such stations may be established by the end of the Third Plan, and another five by the end of the Fourth Plan. Together, the capital cost of these eight service stations will be about Rs. 4 lakhs.

*Cooperatives*

226 5.54 Fishermen's cooperatives in Kerala are not well developed. Most of the
474 societies are credit societies. Only three cooperative societies are engaged in the manufacture of nets and two in the marketing of fish. Recently some Producer Cooperative Societies have been organized under the auspices of the Fisheries Department. Nets, boats, etc., are owned by these societies and the members carry on fishing on a cooperative basis.

*433 5.55 Simultaneously with the development of fisheries in the next decade, the
226 fisheries cooperative should also be strengthened. The aim should be to bring the
474 majority of the fishermen within the cooperative fold. The Integrated Fisheries Development Centres should all be organized on a cooperative basis, covering all aspects of the industry.

*Staff*

*433 5.56 The Fisheries Directorate appears to be adequately staffed for the work it has
228 to deal with at present. However, the implementation of the expanded programme
suggested in this report will not only entail a considerable strengthening of the existing
647 staff, but also require certain new categories of technical personnel. It will be espe-
655 cially necessary to provide an adequate staff to man the mechanized boats and the technical services necessary to operate the boats. A number of training centres should be opened to train the fishermen in the art of mechanized fishing. In addition, each of the Integrated Fisheries Centres should have a trained Marketing Assistant to assist the fishermen and their Cooperatives in organizing the marketing of their catches. It

It 433* 228 647

will be essential to provide a properly trained and experienced Fisheries Development Officer in overall charge of each Integrated Centre for coordinating its activities.

*Training*

5.57 At present there are three centres to train fishermen in the State. The training course which extends over six months aims mainly at training the fishermen in the operation, servicing and maintenance of marine engines, making of nets and tackles, improved fishing methods and the fundamentals of navigation. 274 228

5.58 These centres are located at Neendakara, Ernakulam, and Beypore. The first two centres can train 20 fishermen each in a batch, and the last can train 15. So far, 272 fishermen have been trained at the Ernakulam and Beypore centres (run by the Fisheries Department), of whom 150 are now actually employed in mechanized fishing. At the Neendakara centre, which is run by the Indo-Norwegian Project, 121 fishermen have undergone training so far.

5.59 The programme suggested for the next 10 years would require a crew of about 6,400. This would involve a huge training programme and entail a heavy burden on the State. Arrangements can at best be made to provide training facilities to about half the number. The rest can receive on-the-job training from the trained fishermen. As about 1,200 trained fishermen would be required by the end of the Third Plan, not only will the capacity of the existing training centres have to be increased but also at least five new centres will have to be established. 433* 874 228

5.60 The operation of the proposed medium-sized boats will also require the services of trained skipper-cum-master fisherman. Either a special centre for training skippers should be established in the State, or the facilities at the Government of India Deep-Sea Fishing Stations at Bombay and other places should be expanded. For operating trawlers, the State Government should enlist the collaboration of foreign fishing companies in order to obtain along with the fishing vessels, the services of trained technical personnel. At the same time efforts should also be made to train Indian personnel in the various fields by appointing them as understudies to the foreign technicians or by sending them abroad. The training of Fisheries Development Officers, Marketing Officers and other high level technical staff can be arranged at the Institute of Fisheries Education, which is proposed to be started by the Union Ministry of Food and Agriculture. For training the middle and lower level staff, it is desirable to establish a Fisheries Training Institute in the State.

## INVESTMENT AND OUTPUT IMPLICATIONS

5.61 A substantial part of investment will be on mechanization of boat craft and acquisition of trawlers for off-shore fishing. These two items alone will absorb Rs. 6.35 crores out of a total investment of Rs. 10.72 crores.[1] Details of investment on various items are given in Table 27.[2] This does not include expenditure on deve- 433* 654 228

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[1] The outlay allocated for the Third Plan is Rs. 4.5 crores, which will leave a balance of Rs. 6.75 for the Fourth Plan, if suggestions made in this Report are to be implemented.

[2] [Table 27, appearing on p. 289 of the text, has not been processed.--Analyst]

*
433 lopment of fishing harbours, landing and berthing facilities, rail transport, training,
654 welfare work, cooperatives, research, etc. A considerable part of the expenditure will
228 be in the form of loan to fishermen recoverable in course of time.

5.62 As a result of this programme the additional production of fish by the end of the Fourth Plan can be expected to be of the order of 200,800 tons per annum, valued at Rs. 5.26 crores. These programmes for fishing development would create additional employment opportunities for about 33,000 persons in Kerala during the next decade. This figure, however, does not include employment opportunities which would be created by the development of culture fisheries, marketing, net-making, transportation, supervision and training.

## Chapter 6

# Minerals

FROM THE POINT of view of its industrial development, Kerala's mineral resources 433* are a weak link in the State's economy. With a share of only 1.7 per cent in the 136 all-India production of the minerals, Kerala lags behind most other States in the output of minerals. During 1955-56, the net value contributed by the minerals [434] (Rs. 1.95 crores) was 0.6 per cent of the State income against one per cent of country's income.

6.2 The important minerals of the State are beach sands comprising ilmenite, monazite, rutile, sillimanite, zircon, china-clay and tile-clay. Among these ilmenite and china-clay are the most prominent. The reserves of these minerals are adequate to last more than 20 years and may, therefore, be classified as "minerals with adequate reserves". Graphite, iron ore and mica are also found, though only in very small quantities. The deposits of limeshells occur in lakes and along the coast, but are rather modest in content. The metallic minerals and fossil fuels, however, are almost completely absent. It is the deficiency of these minerals which presents an obstacle to the growth of large scale industries.

6.3 Apart from beach sand collection and limeshell winning from the lakes and 316 estuaries, there are eleven workings, all open cast. These do not include tile-clay 317 working about which no data is available. The number of persons engaged in all 464 these 11 mining enterprises (inclusive of beneficiation) is roughly 6,900. However, according to 1951 Census, the number of persons employed in mining as well as in stone-quarrying is about 18,000, i.e., 0.3 per cent of total working force (all-India 0.4%).

6.4 Table 28[1] gives the output of minerals from the various workings and 433* their value. In 1955, the value of minerals production was Rs. 1.35 crores. 316 Next year, the value of production went upto Rs. 1.95 crores, representing an 317 increase of approximately 37 per cent. This steep rise was mainly due to the increase in ilmenite production, which went upto 314,348 tons in 1956 from 231,585 tons in 1955. Production registered a further increase of about Rs. 20 lakhs during the next year, (that is, 1957), reaching a level of Rs. 2.1 crores. This was maintained during the next two years, that is, 1958 and 1959. In 1960, however, there was a setback as one of the mineral sand companies had since closed down; and it is likely that the value of the output might not have exceeded Rs. 1.3 crores. [Text continues on p. 99]

[1] [Table 28, appearing on p. 289 of the text, has not been processed -- Analyst]

MAP 9

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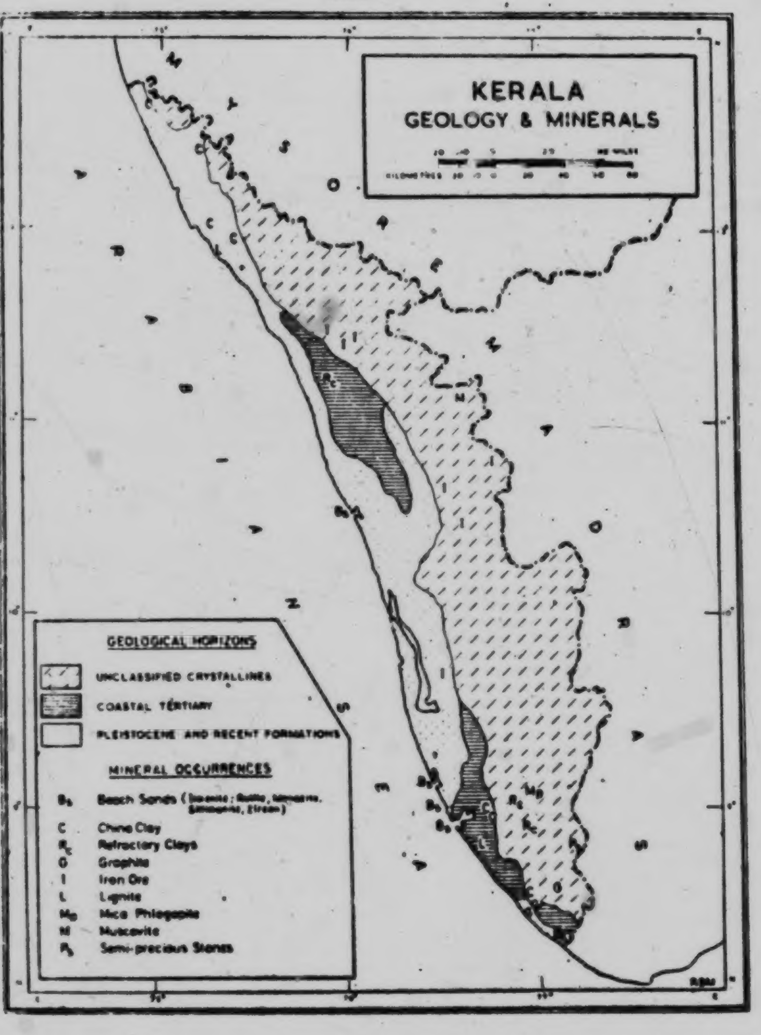
KERALA
GEOLOGY & MINERALS
MILES
KILOMETRES
GEOLOGICAL HORIZONS
UNCLASSIFIED CRYSTALLINES
COASTAL TERTIARY
PLEISTOCENE AND RECENT FORMATIONS
MINERAL OCCURRENCES
Bs Beach Sands (Ilmenite; Rutile, Monazite, Sillimanite, Zircon)
C China Clay
Rc Refractory Clays
G Graphite
I Iron Ore
L Lignite
Mp Mica Phlogopite
M Muscovite
Ps Semi-precious Stones

## MINERAL RESOURCES: SIZE OF DEPOSITS AND EXTRACTION COST

6.5 In the following pages the importance of the mineral resources, the size of the deposits, costs of extraction—and allied factors, as they affect the industrialization programmes for Kerala, are discussed at some length. 128

### *Ilmenite*

6.6 Foremost among the mineral resources of the State are the beach sand deposits in Quilon district which contain large concentrations of heavy minerals like ilmenite, monazite, rutile, sillimanite and zircon. Some of the ilmenite is of inferior quality due to leucoxenization, particularly along the Neendakara—Azhiyikkal bar. 317 [438]

6.7 The heavy mineral occurrences are of three types:

- (*i*) Back beach sand dunes, which form a wasting asset.
- (*ii*) Beach washings, which are renewed seasonally during the monsoons.
- (*iii*) Sand bar.

In general, the beach washings have a higher content of ilmenite and other heavy minerals than the dunes and the sand bar. The extent of the variations in this respect may be seen in the table below:

| | *Beach washing* (*Per cent*) | *Dunes* (*Per cent*) | *Sand Bar* (*Per cent*) |
|---|---|---|---|
| Ilmenite | 75/70 | 60/70 | 40 |
| Other heavy minerals | 15/20 | 10/25 | -- |
| Quartz | around 50 | 10/15 | 60 |

6.8 Of these, the dune deposits are rapidly being used up; and as for the washings, it is not possible to predict the quantities that are likely to be available from time to time. The main reliance for ilmenite has, therefore, to be placed on the sand bar, the total reserves from which are estimated at 34.08 million metric tons.[1] Another estimate places the reserves at 50 million tons. In addition, there are a few minor occurrences in the lake deposits, and in the interior of the country beyond 500 feet of the shoreline. 433 317

6.9 At present, however, nearly half the requirements of raw sand come from the washings and the other half from the dunes. The collection of raw sand is done through contractors who supply the sand to the mineral companies. The dune sand is worked manually with a wooden scraper and the pools are very often not backfilled. Beach washings are merely scraped off the beach wherever they accumulate. The cost of the raw sand from these sources works out to nearly Rs. 8 a ton.[2] [435]

[1] *Peaceful Uses of Atomic Energy*, Proceedings of the Second International Conference, Geneva, 1958, p. 106. [113]

[2] *Quartz sand at Pallipuram*—pits mouth value Rs. 1.50 a ton.

*433 6.10 The present method of working these sands is haphazard and extremely
317 short-sighted. The dunes are getting exhausted while the washings are dependent on a good monsoon. A better method would be to work the sand bar itself. This would also be in the interests of (*i*) conservation and (*ii*) ensuring a regular supply of raw sand independent of the vagaries of nature. Even if working of the sand bar suggested above is not taken up now, back filling of pools with sand tailings from mineral sand companies would prove beneficial. It would lead to building up of sand rich in heavy minerals, other than ilmenite. At present the tailings which contain 80 per cent of the original rutile and all the sillimanite and zircon, are dumped into the sea.

317 6.11 The extraction of ilmenite is done by the mineral sand companies at Chavara.
328 Till recently there were four units, namely, two units belonging to the Travancore
471 Minerals, one to F.X. Pereira Minerals and one to Hopkins and Williams. These
concerns were all under private ownership till 1945. Realizing the strategic impor-
655 tance of these sands, the Travancore State assumed control of the sand deposits during that year ; and the mineral concerns continued to work as agents on behalf of the State. A few years later, however, the Travancore Minerals (1951) and F.X. Pereira Minerals (1956) were taken over by the State Government and run directly as State enterprises.

*433 6.12 Hopkins and Williams, however, continued in private hands till 1959.
317 By this time some difficulties cropped up with labour. The firm had also accumulated
328 vast arrears of royalty to the tune of Rs. 28 lakhs. At this stage the management
471 decided to close down the unit. In the interim period their export contracts had also lapsed. As a result of all these developments, there are two mineral concerns at present operating three units, whose total capacity is 1,60,000 tons. In view of the reduced foreign demand for Indian ilmenite, closure of Hopkins and Williams has not created any serious problem.

*433 6.13 The output per man per shift works out to 0.41 ton at the Travancore
317 Minerals Plant and 0.40 ton in the F.X. Pereira unit ; whereas in the Hopkins and
328 and Williams plant, now closed, the output per man per shift was around one
461 ton. This was partly due to a better layout of the machine. In the existing plants much effort and material is lost in transportation from one unit to another. In addition, excessive labour appears to be employed in the plant of the Travancore Minerals (P) Ltd.

*433 6.14 The production of ilmenite rose from 216,000 tons in 1950, to a peak of
317 314,000 tons in 1956. Since then it has been fairly steady between 270,000 and
328 290,000 tons. The value has also been going up from Rs. 33 lakhs in 1950 to Rs. 170 lakhs in 1959. The present price is Rs. 60 per ton.

317 6.15 Ilmenite is mainly used in the manufacture of $TiO_2$ (titanium) white pig-
328 ment. $TiO_2$ is used in various other industries like paper, delustrant in rayons, rubber
386 compositions, plastics, printing inks, cosmetics, etc. Titanium metal is not widely used mainly because of its high cost of production.

6.16 Only a very small portion of the production of ilmenite is consumed within
* the State in the manufacture of $TiO_2$. The Travancore Titanium Products Ltd.,
[433] Trivandrum, utilize about 3,000 tons of this mineral. This plant is expanding its capacity to 10 tons a day by 1961, and will then require 6,000 tons of ilmenite. The

rest of the production is exported to various countries, the bulk of it going The to the 317
USA and the UK. Export figures are given in Table 29 for the period 1956–59. 328

6.17 Irregular supplies made through the Koilthottam port, mainly due to labour 439
difficulties, have resulted in the loss of contracts with importers in the USA. Export possibilities of ilmenite are now limited only to two contracts to UK totalling 1,50,000 tons per year. This setback has occurred in spite of the fact that the Chavara ilmenite has a high $TiO_2$ content (55-60%) and is cheaper when compared to Malayan ilmenite (about 45% $TiO_2$) which, however, finds a ready export market.

6.18 India, which at one time used to hold almost a monopolistic position in the export of ilmenite has now to face competition. Side by side with the expansion of titanium industry, other world sources for supply of ilmenite have come into operation as in Norway, Canada, Malaya, Australia, South Africa, etc. Whereas in 1940 India used to contribute 90 per cent to world production of ilmenite, now its share is only 25 per cent.

6.19 In view of the rapid expansion of India's steel industry, the consumption of 433*
$TiO_2$ pigment is itself expected to go up. The total requirements of ilmenite by 1965-66 317
would be 150,000 tons a year for export and 36,000 tons a year for the manufacture 328
of $TiO_2$ pigment, on the basis of proposal for expansion of Titanium Dioxide plant
at Trivandrum incorporated in this report. Table 30*gives demand for Titanium 386
Dioxide pigment from steel industry and various other sources. The two existing companies can produce about 160,000 tons a year. Extra capacity of 30,000 tons a year will have to be installed, and this along with certain improvements suggested earlier may require an investment of Rs. 20 lakhs. Very little increase in labour force is envisaged. The existing labour force itself appears to be excessive, since the output per man per shift works out to a low level of 0.4 tons.

6.20 During the Fourth Plan period, steel production is expected to double itself. Therefore, by 1970-71, the demand for Titanium Dioxide may also be expected to be roughly double of the demand in 1965-66. This would necessitate another 30,000 tons of ilmenite per annum. Total requirement of ilmenite by 1970-71 would thus be 220,000 tons a year, comprising of 150,000 tons for export and 60,000 tons for the manufacture of Titanium Dioxide. This would involve further additional outlay of Rs. 10 lakhs. Even this order of expansion can be achieved with the existing labour at an output of one ton per man per shift which would measure a fairly reasonable level of productivity.

### *Monazite*

6.21 Monazite is a phosphate of thorium and cerium with rare earth elements 135
and small quantities of Uranium Oxide. It constitutes a source of the radio-active element, thorium being used for atomic energy purposes. Monazite was first discovered in India, by C.W. Von Sohomberg, a German citizen, in 1909 along the beach at Manavalakkurichi.

6.22 Monazite occurs along with other heavy minerals in the beach sands. Reserves of the order of 6.7 million tons are estimated to be present in the bar between Neendakara and Kayarkulam. There is, however, no production of monazite

*[Table 30, appearing on p. 290 of the text, has not been processed--Analyst]

135 concentrates from Chavara, the Manavalakkurichi (in Madras State) material being preferred because of its higher thorium content.

317 6.23 A rare earth factory is located in the State at Alwaye, which processes 1,500
328 tons of monazite a year ; but it obtains its requirements from Manavalakkurichi in the Madras State. This factory produces Thorium Oxide, rare earth salts and
[439] Trisodium Phosphate. The Chavara Monazite may be considered for use in the rare earth factory instead of the monazite from Manavalakkurichi in Madras State, particularly in view of the fact that monazite would be a byproduct of ilmenite which is won in larger quantities in Kerala and may, therefore, prove cheaper.

*Rutile*

317 6.24 Rutile is another titanium mineral occurring in smaller quantities in the beach sands. The beach washings contain, on an average, about 4 per cent of rutile. A portion of the sand bar at Neendakara is estimated to contain 740,125 tons of the mineral.[1] Kerala is the only State in India producing rutile.

317 6.25 At present only one of the mineral sand factory units produces this mineral.
328 Electro-static separators are used in concentrating rutile from the non-magnetic tailings after the extraction of ilmenite. Recovery is one-fifth of the rutile content of raw sand and the rest is allowed to go into the tailings for lack of equipment.

*433 6.26 Only small quantities of rutile are produced. During 1959, 482 tons valued
317 at Rs. 4.75 lakhs were beneficiated. The current price is Rs. 1,000 a ton. The mineral is not utilized in the State, but is sent to Bombay and Calcutta for the manufac-
328 ture of welding rods. During 1957, 155 tons of rutile were imported to meet the
[439] requirements of this industry. Future requirements of welding rods within India is
[435] estimated to go up from 417 m. ft. in 1960-61 to 2,022 m. ft. in 1970-71.[2] To meet this rise in demand, output of rutile would have to be stepped upto 6,750 tons by 1970-71. An expansion in capacity of this order would require an investment of the order of Rs. 10 lakhs.

*Sillimanite and Zircon*

135 6.27 Sillimanite as well as zircon occur in small amounts in beach sands in association with ilmenite and other heavy minerals. They average 5.9 per cent and 4.2 per cent respectively of the beach washings. In addition, 1,916,260 tons of sillimanite and 799,350 tons of zircon are estimated to form a part of the Neendakara bar.[3] Only experimental production of either of these minerals has been taken up so far.

*433 6.28 Sillimanite is mainly used in refractories, but the internal requirement of
317 sillimanite refractories is very small. Moreover, the material from Assam which is of a massive variety can be shaped into blocks and used directly. Export possibilities are also dim and due to the development of artificial mulite bricks from domestic kyanite in the USA. Exports have dropped from 20,000 tons to 6,000 tons in 1957.

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[1] *Peaceful Uses of Atomic Energy*, Proceedings of the Second International Conference, P. 102.

[2] NCAER estimates.

[3] *Peaceful Uses of Atomic Energy*, Op. Cit, p. 102.

6.29 Zircon is also commonly used in refractories. The pattern of consumption of zircon is as follows: 433* 317

| | (*Per cent*) |
|---|---|
| Refractories | 45 |
| Vitreous enamels | 7 |
| Electrical and chemical industries | 3 |
| Foundry facings | 19 |
| Glass | 1 |

In addition, zircon was considered for use in nuclear reactors. But the great geochemical coherence between zirconium and hafnium makes it unsuitable for this purpose, since their separation is very costly. Niobium is, therefore, replacing zirconium in reactor technology. In view of these factors both zircon and sillimanite do not possess very bright prospects.

### *China-Clay*

6.30 China-clay is the principal raw material for the manufacture of china and other porcelains. Apart from this, it finds a number of uses, as for example, in sizings for textiles and as fillers for paper, rubber, linoleum, soap and cosmetics, as well as for pastels, pencils and insecticides. The quality of china-clay found in Kerala especially in Kundara, is claimed to be one of the finest in India. The china-clay occurrences, reported from Changanacheri in the north to beyond Trivandrum in the south, constitute one of the most important horizons in South India. 317

6.31 According to a survey carried out by the Geological Survey of India, the china-clay deposits in Trivandrum and Quilon districts are extensive. In the Kundara area, it is estimated that one square mile would yield 22 million tons of china-clay. In addition, reserves of the order of 40,000 tons are stated to be available at Murukkampuzha. In the Vanchi clay mines at Chathannoor, the clay horizon has an average thickness of 10-15 feet. The occurrences reported from Ernakulam and Kozhikode districts are either very small or very inferior. 433* 317

6.32 There were six mines in operation in 1960; one of these, viz., the Kundara clay mines is run by State Government; the others are privately operated. All the mines are open surface workings and mining is by manual labour. With the exception of the working at Kurukkampuzha, all the others have washing plants attached to them. Production of crude china-clay in these concerns during the past few years has been steadily rising as may be seen from the following table:

| Year | *Quantity* (Metric tons) | *Value* Rs. |
|---|---|---|
| 1956 | 15,401* | 355,000* |
| 1957 | 15,578 | 319,000* |
| 1958 | 17,047 | 486,000 |
| 1959 | 21,454 | 603,000 |

**Mineral Production in India, 1957*

6.33 The quantity in the Kundara Clay Mines has already been taken to a depth of 35′ in the china-clay horizon. Further deepening, it is feared, will only result in material of lower or partly altered basement gneiss being won. However, in view of

*433 317 the extensive horizontal spread of this horizon, mining operations are capable of considerable lateral expansion.

[655] [939] 6.34 The china-clay from Quilon and Trivandrum districts is mostly consumed within the State by the Government-run ceramic factory at Kundara and the other privately owned ceramic factories, as well as by the rubber, paper, insecticide and cement (for white cement) industries in the State. A few hundred tons are supplied to consumers in the neighbouring States and a small quantity is also (75 tons in 1959 and 44 tons during Jan.—August 1960) exported to Ceylon. The crockery and sanitaryware plants in the State consume about 1,900 tons of refined clay and another 1,700 tons are used by the insecticide, rubber and paper factories in the State. The china-clay produced from Cannanore district is mostly exported to other parts of India.

6.35 It is worth noting here that India imports textile grade china-clay. Import figures for 1956 and 1957 are 7,282 tons and 4,354 tons respectively. The State could very well fill this gap particularly in view of the excellent quality of the material it possesses. Increase in output to meet this demand should be undertaken from the Quilon district, where large reserves are available.

6.36 Demand for china-clay (in terms of crude material)[1] is likely to be as under by 1965-66:

| | (Tons) |
|---|---|
| For ceramics, inclusive of insulators | 9,000 |
| For the rubber, paper and insecticide industries | 10,000 |
| For the textile industry | 15,000 |
| For white cement manufacture | 12,000 |

6.37 During the period 1966–71, china-clay requirements are likely to go up still further as a result of setting up of another high tension insulator factory and increase in demand from the paper, textile and insecticide industries, and are estimated to reach 70,000 tons in terms of unwashed clay by 1970-71. To meet this rise in demand, mining in the public sector at Kundara can be expanded to produce an additional 13,500 tons by 1965-66. This would hardly involve any mechanization. Along with this, the capacity of the washing plant will have to be increased to 30 tons a day. The expansion of mining operations and installation of additional washing capacity proposed would roughly involve a capital outlay of Rs. 5 lakhs.

6.38 Reopening and development of the mines at Chathanoor should also be considered at a rate of exploitation of 22,000 tons of crude clay per year. A washing plant with a capacity of 30 tons a day would be required at this mine. This mine and washing plant may be operated in the private sector. The capital outlay required would be of the order of Rs. 5 lakhs and the mine and washing plant would together provide employment for 310 persons.

6.39 In order to produce an anticipated 70,000 tons per year by 1970-71, representing an increase of 24,000 tons a year over the Third Plan period, a further expansion of mining operations and additional washing capacity of the extent of 20 tons a day will have to be considered either at Kundara or Chathanoor. The additional investment for this will be about Rs. 5 lakhs and additional employment for 350 persons. 433* 317

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[1] Refined china-clay is roughly one-third the weight of crude china-clay.

## *Graphite*

6.40 This mineral occurs in the form of disseminated grains, stringers and thin veins in surface laterites and the crystalline rocks underneath, mainly charnockitic and associated types. While the disseminated grains occur in charnockitic rocks, the worthwhile occurrences appear to be confined to the area of leptynites.[1] 135

6.41 Surface occurrences of graphite are known to occur in Kerala at a number of places, viz., Plachikuzhi, Nellimood, Narical, Ozhupara, Karipur, Perumpallimuzhi and Vellanad in Nedumangad taluk, Puliyarakonam and Chenagalloor in Neyyattinkara taluk and in various other isolated localities in Trivandrum district. The occurrences are being investigated geo-physically using electrical methods without appreciable success. This is probably due to the electrical anomalies being marked by the laterite host rock. Perhaps geo-chemical methods may prove more fruitful. 316

6.42 This mineral was mined in Kerala between 1898 and 1911 by the Morgan Crucible Company, altogether 35,000 tons of material being won. Consequent upon the discovery of graphite in Madagascar, operations ceased in Kerala. The most productive mine was at Vellanad. Recently operations were started at Aukulam on a small scale, but were suspended shortly thereafter. The production has been negligible. The prime need in the near future will be to have a more detailed prospecting on the lines suggested. 433* 316

## *Iron Ore*

6.43 Quartz-magnetite bodies are reported from various localities. In all these cases, the top of these bodies is laterized and often very rich in iron. However, within a few feet the iron content decreases very appreciably. 135

6.44 The Nanminda occurrence (Pookunnu Hill) is probably the largest one. It would be necessary to explore this area in detail, possibly with core drills before any reasonable conclusion can be drawn. The ore body is steep dipping and will have to be won by underground mining, and further, magnetite concentrate obtained. All this would make the prospect very dear when compared to other iron ore occurrences elsewhere in the country being currently exploited. Further, the possibility of establishing a pig iron plant based either on low-shaft furnaces or electrical furnace techniques, is fraught with difficulties because of the non-availability of coke or lignite and fluxing material within the State. 433* 135

## *Limeshell Deposits*

6.45 Even though no important horizon of limestone is found in the State, limeshell is found to occur in the various backwaters and also in the estuaries of some 135

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[1] I.C. Chacko: *A Sketch of the Geology of Travancore.*

135 of the rivers. The best known among these is that of Vembanad lake ; other less important occurrences are in the estuaries of the Kadalundi and Korapuzha rivers, Kozhikode district and Cranganore lake. Only a few of these tracts have been prospected so far. A systematic exploration programme should, therefore, be initiated in all the backwater and estuarine tracts.

317 6.46 The deposits in Vembanad lake were surveyed by the Travancore Cement Company in 1946. There was no layer of limeshell as such, but it occurred amidst sands and clays, the total thickness of the mixed deposits varying from 1-7 feet. Reserves as estimated then were 3 million tons.

6.47 In addition, in the estuary of the Kadalundi river 400,000 to 500,000 tons of limeshell are estimated to be available in an area of 300 acres.[1] About 100,000 tons of material is also likely to be available from the lower reaches of the rivers Pullut and Thathapally which drain into the Cranganore lake.[2]

6.48 These limeshell deposits provide a raw material of very high purity and which is eminently suitable for use in the chemical industry and in the manufacture of white cement.

+433 317 6.49 The present production is mainly from Kottayam and Alleppey districts, where the Vembanad lake deposits are exploited. Small quantities are also won from the Kadalundi and Korapuzha estuaries. Details of production available for 1959 are given below:

| *District* | *Quantity* (Metric tons) | *Value* (Rs.) |
|---|---|---|
| Alleppey | 9,098 | 76,542 |
| Kottayam | 86,509 | 696,333 |
| Kozhikode | 500 to 1,000 | N.A. |

+433 317 339 6.50 Excepting small quantities sent to the adjoining States from Kozhikode district, the State's output is consumed within the State. The cement company consemus 70,000 tons of shells a year for producing 50,000 to 60,000 tons of grey cement. About 26,000 tons a year are used in lime-burning of which 25,000 tons come from the Vembanad lake.

6.51 Other limeshell utilizing industries which are under active consideration are a sand-lime brick factory at Pallathara with a capacity of 44,000 bricks a day and a calcium carbide factory at Chingavanam with a capacity of 10,000 tons a year. Both these would use shells from Vembanad lake and their annual requirements would be 8,500 tons and 10,000 tons respectively.

6.52 The total annual requirement during 1961--66 would thus be 108,500 tons of shells from the Vembanad lake. In view of the fact that the cement factory has been in existence for the last 11 years and has already consumed about a third of the original reserve of 3 million tons, proposals for new limeshell-based industries in the same area introduce problems regarding assured reserves of raw materials and their conservation.

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[113] [1] *Administration Report of the Geological Department*, Government of Kerala, 1958-59, pp. 3-4.

[2] Ibid pp. 3-4.

6.53 First, possibilities of an alternative source, e.g., shells from the sea, should 433*
be assessed quantitatively, which could possibly meet requirements of the local 317
lime-burning units. This would relieve the pressure on the lake and estuarine 339
deposits, which could then be conserved for larger industrial units.

6.54 Secondly, new industries could perhaps be located near other known shell deposits. A case in point here is the Calcium Carbide Factory requiring about 10,000 tons annually, which could be located in the Kadalundi area where reserves of the order of 400,000 to 500,000 tons are available. In this location the unit would be assured of its shell requirements for the next 40 to 50 years on the basis of an average annual requirement of 10,000 tons, whereas in the Vembanad lake location, reserves would last only for 15 to 20 years.

6.55 The requirements of the sand-lime brick factory, however, are only about 3,500 tons a year and it should be possible to accommodate this requirement from the present consumption of 25,000 tons by the lime-burning industry.

6.66 In this context, it would be relevant to mention that in absolute terms, 433*
the accretion of shells is rather small; and in terms of the proposed rate of exploitation 317
this accretion is even negligible. Further, the proposal to construct a bar across the mouth of the Vembanad lake would change the salinity of the water and would very likely put an end even to this small accretion. As to whether the shell organism could be simulated to thrive on a large scale is a problem for long term research.

6.57 In the meantime, in view of the rapid depletion of reserves in the Vembanad lake, strict control should be exercised over the exploitation of this deposit with periodical inspection to check unauthorized collection. The rate of exploitation may be kept at the present level but should not be allowed to rise.

### *Mica*

6.58 Two varieties of mica, muscovite and phlogopite are known to occur in 135
the State. Muscovite is reported from Kulikhoor, and Sholayaramson from Palghat district and phlogopite from Punalur in Quilon district. However data relating to reserves are not available for any of these deposits.

6.59 At Kulikoor in Palghat district, a few prospecting pits have been put down 316
which exposed a small vein of ruby mica with very little strains. The presence of ruby mica on a fairly large scale along the same belt in the adjoining State may be taken as a favourable indication. Further prospecting should be undertaken in the area.

6.60 Production from the only mine in the State at Punalur has been intermittent. 433*
Figures for production since 1957 when mining activity was revived are given below: 316

| Year | *Quantity* (Metric tons) | *Value* (Rs.) |
|---|---|---|
| 1957 | 72 | 40,000 |
| 1958 | 72 | 40,000 |
| 1959 | 46 | 23,000 |

*433 316 6.61 Formerly mica used to be exported from this mine, but now because of its inferior grade and development of cheaper substitutes, the market has ceased to exist. Production has been giving demand and the mine is again on the verge of closing down.

*Quartz-Sand*

135 6.62 An extensive deposit of quartz-sand occurs along the Shertallai-Pattanakad-Pallipuram-Panavally area. Reserves of the order of 80 million tons are said to exist here. However, all the sand is not glass grade, being gritty in large portions.

317 6.63 There are two workings in Shertallai taluk, one at Pallipuram and the other at Panavally. Mining is selective in that only such areas which contain finer material are worked. The workings are not mechanized. The raw sand is sieved and winnowed at the workings. Further sieving is done at the glass factory, the final recovery standing at 50 per cent of the original, and represents the portion between 30 and 80 mesh screens.

*433 317 [323] 6.64 About 3,000 tons sand is produced annually with a pits-mouth-value of Rs. 1.50 a ton. A major portion of the output is consumed by the glass factory at Alwaye, while the rest is supplied to silicate factories in the State and consumers outside the State.

6.65 A sand-lime brick factory is coming up at Pallathara in the public sector with an installed capacity of 44,000 bricks a day and it will be a major consumer of quartz-sand. Its sand requirements would be 33,750 tons a year. The total raw sand requirements by 1965-66 would be 46,000 tons a year. Exploitation at this rate would require an investment of Rs. 2 lakhs. By 1970-71, the sand requirements would further increase to 90,000 tons a year requiring an additional investment of Rs. 15 lakhs. At the same time, an integrated scheme to work the sands systematically and utilize both the coarse and finer grades should be undertaken, rather than leaving the sand collection to contractors.

*Salt*

6.66 Salt, besides being an essential ingredient of food, also serves as a basic raw material for the manufacture of alkalies. It is commonly extracted from sea water by solar evaporation. Production of salt in Kerala during the last few years has been as follows :

| *Year* | *Quantity* (Metric tons) | *Value* (Rs.) |
|---|---|---|
| 1955 | 56,094 | 1,180,000 |
| 1956 | 783 | 10,000 |
| 1957 | 336 | 5,000 |
| 1958 | 708 | 10,000 |
| 1959 | 1,087 | 13,000 |

6.67 In the erstwhile State of Travancore-Cochin, there were 14 centres of pro- 433*
duction around Cape Comorin and one at Malipuram, Vyppeen Island, Ernakulam 317
district. Consequent upon reorganization of the States, there is only one salt work in
Kerala today. This is reflected in the sudden drop in production to a few hundred
tons of salt between 1955 and 1956.

6.68 The prime requisite for the manufacture of salt by the solar evaporation (132)
method is a dry climate with accompanying low humidity. Such a condition is
rarely obtained anywhere in the State. The result is that the yield of salt is very (435)
low with the cost of production at 75 nP. to a rupee per maund (in Tuticorin—cost of
production is 25 nP.). In view of the unfavourable climatic conditions, this industry
does not appear to have much prospects in the State.

### *Tile-Clay*

6.69 Tile-clay is the raw material for one of the major industries of Kerala viz., 339
the tile industry. More than 150 tile factories operate in the State, providing
employment to over 10,000 workers. Tiles produced are sent to other parts of India (439)
as well as to markets in some of the Far Eastern countries. The exports are mainly
from the Feroke area.

6.70 Local earths, silts and clays are found along the alluvial flats of most of the 317
rivers of the State. Clay collection is seasonal and is undertaken through contractors.
It provides employment to about 3,500 people. Collection is done manually and (464)
the clay is transported by countrycrafts along the waterways, or by roads, where
water transport facilities are not available. Depending on the distance of transpor-
tation, the price of clay varies from Rs. 2 to Rs. 5 per ton at the factory.

6.71 In 1865, the 'Basel German Industrialists' started the first tile factory in the 339
country at Mangalore with the object of securing the Far East Market, which was
until then being supplied by the French tile industry in Marseilles. The industry then
spread rapidly, first to Feroke near Kozhikode and later on to Quilon and other areas,
until today, Kerala can well claim to be the home of the tile industry in the country.

6.72 Production of tile-clay in the State during the last few years is given in 433*
Table 31.[1] 339

6.73 As can be observed, there has been a declining trend in tile production.
The main part of the decrease has taken place in the major tile producing areas of
Trichur and Quilon,

6.74 The decline in output of tiles is due to a shrinkage in the foreign markets.
On the other hand, an optimum area for distribution within the internal market is
a belt of 400 miles from the coast. In view of the near saturation point which
Kerala's tile industry has reached, prospects for increased production of tile-clay are
rather bleak.

### *Other Minerals*

6.75 *Gold* : Occurrences of gold in Wynaad and Nilambur area have been 433*
known since the late nineteenth century. The discovery of old workings led to the 316

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[1] [Table 31, appearing on p. 291 of the text, has not been processed -- Analyst]

*433 316 formation of a large number of companies which together won 600 ozs. of metal. During the last war, operations were again commenced but mainly for pyrite, which were also given up.

6.76 It is obvious that all surface occurrences have been worked out. However, prospecting for hidden lodes could still be carried out. A preliminary survey by panning up the stream to the heads of the tributaries in search of mother lodes is indicated.

135 6.77 *Lignite*: A lignite occurrence two feet to eight feet thick exposed on the beach at Varkalai had been reported, but it has proved to be abortive on drilling.

6.78 *Semi-Precious Stones*: The presence of semi-precious stones like cats' eye, amethyst, and iolite are reported from various places in Nedumangad taluk, Thiruvalla and Kollengode, but none has proved worthwhile. Recently beryl has also been reported from mica bearing area at Kulikkoor in Palghat district. .

6.79 *Kankar*: In the black cotton soil tracts of Kozhinjampara and Chittur firkas in Palghat district kankar limestone is met with and is used locally in lime burning.

6.80 *Gypsum* : It is known to occur in similar soils in the Coimbatore district of Madras State. An intensive search may, therefore, be made in these black cotton soil areas for this mineral.

## CONCLUSIONS

*433 135 6.81 Mineral resources play a vital role in the economic development of any region. The process of industrial development generally involves a shift from industries based on primary raw materials like agricultural or forest produce to more technologically advanced industries using a higher content of metallic minerals. Kerala is unfortunately placed in this respect as its mineral resources are marked by absence of any of these basic minerals, namely, coal, iron and copper.

*433 317 6.82 Some of Kerala's industries, however, do have good prospects. Beach sands, the chief mineral assets of Kerala, are the source of titanium bearing ilmenite. Although possibilities of increase in export of this sand are not bright, internal demand for ilmenite from the Titanium Dioxide industry is expected to rise substantially. Similarly, extensive deposits of quartz sand and fine quality china-clay occur in the State. This report envisages a considerable expansion in demand for both of these from existing industries as well as from new factories suggested for production of high tension insulators, sand-lime bricks, etc. In contrast to these three, the other minerals have only limited potentials of development. Thus monazite which contains the radioactive element thorium is available in quantity but has a restricted demand at present. On the other hand, the known reserves of limeshell are in short supply and do not offer scope for expansion of the cement industry based on it.

[135] 6.83 Among the rest, iron ores are not capable of being developed for lack of coal while mica and graphite would depend entirely on future discoveries.

6.84 On the whole, an increase in mineral production from a value of Rs. 130 lakhs in 1961 to Rs. 197 lakhs by 1965-66 and Rs. 250 lakhs by 1970-71 is envisaged here. Between 1956 and 1961 there was, however, a fall in the value of output from

Rs. 200 lakhs to Rs. 130 lakhs mainly due to the loss of export market for ilmenite, in the USA. 433*

6.85 An increase in the minerals output between 1961–71 of the above order is estimated to require an investment of Rs. 56 lakhs during 1961–66 and Rs. 35 lakhs during 1966–71. Additional employment, however, is expected to increase only by about 2,000, that is, from 7,000 to 9,000 persons. The existing labour employed in ilmenite concerns is rather excessive, and it is considered that output of ilmenite can be raised without much extra labour. These results are summarized in Table 32.[1] 317

[1] [Table 32, appearing on p. 291 of the text, has not been processed--Analyst]

# Chapter 7

## Power

*433 KERALA HAS IMMENSE potentiality for the generation of hydro-electric power. The
377 State does not possess any resource of coal or oil (within its own boundary) for gene-
[135] ration of power but there are 44 rivers which constitute a storehouse of hydel power.
[133] This favourable factor compensates for the absence of any fossil fuels. Investigations so far have led to an estimate of this potential to be roughly of the order of 1,539 MW.[1]

*433 7.2 One of the basic problems of Kerala's economy is posed by the situation of
414 acute unemployment prevailing in the State. A long run solution to this lies in
377 an intensive programme of industrialization only. An accelerated pace of industrial development, in turn, requires an ensured supply of adequate power. One possible way of looking at power development activities is to consider power as a complementary factor in the programme of industrialization of the State. Targets for power generation capacity in such cases should be fixed slightly higher than what the demand is expected to be.

*433 7.3 The alternative approach, which is the more feasible one for Kerala, is to
377 consider power, generation itself as an industry and to develop the State's abundant hydro-power resources to the maximum extent possible. The surplus of electricity generated over local requirements could be exported to the neighbouring State of Madras, which is not so well placed in respect of its power resources as Kerala. The electricity exported would provide a means of earning revenue, which is turn could be utilized for capital formation within the State. Moreover, a surplus in power generation capacity is desirable in itself since for a State like Kerala, where some factors deterrent to industrialization have been operating in the past, a regular supply of adequate power should be made to act as an incentive for setting up new industries. Planning for a power surplus and export of electrical energy to the neighbouring States should, therefore, form the keynote of the future power development policy in the State.

### DEVELOPMENT OF POWER

7.4 The process of power development in the State is already well set. What is now required is to harness the huge energy potential of the State and convert it

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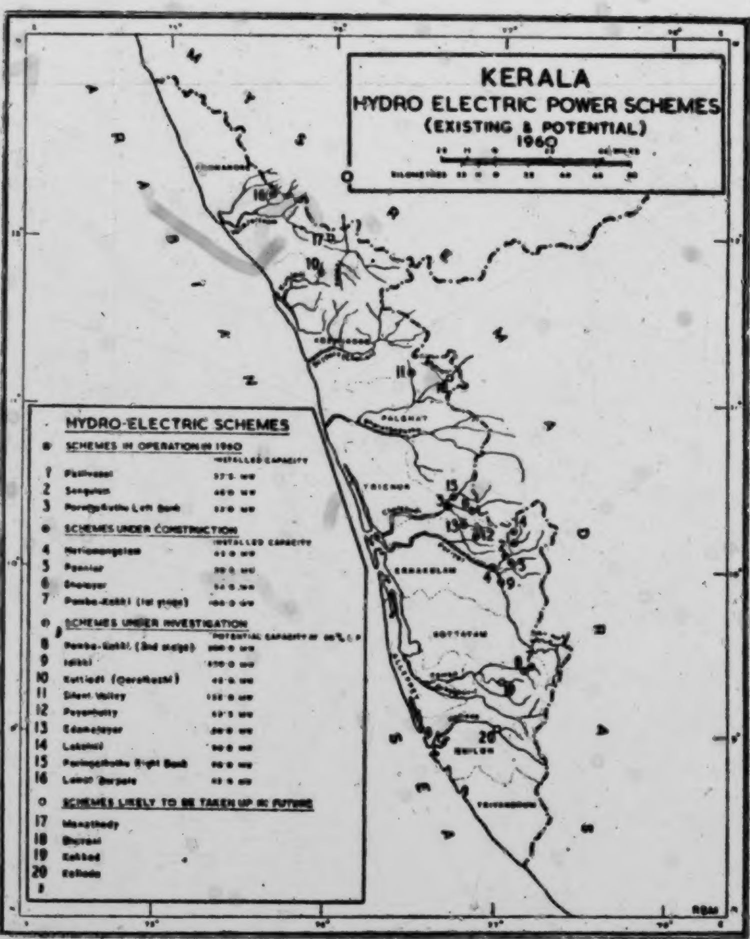
[1] By the Central Water and Power Commission.

[text continues on p. 112]

MAP 10


KERALA
HYDRO ELECTRIC POWER SCHEMES
(EXISTING & POTENTIAL)
1960
KILOMETRES
HYDRO-ELECTRIC SCHEMES
SCHEMES IN OPERATION IN 1960
INSTALLED CAPACITY
1 Pallivasal 37.5 MW
2 Sengulam 48.0 MW
3 Poringalkuthu Left Bank 32.0 MW
SCHEMES UNDER CONSTRUCTION
INSTALLED CAPACITY
4 Neriamangalam
5 Panniar
6 Sholayar
7 Pamba-Kakki (1st stage)
SCHEMES UNDER INVESTIGATION
POTENTIAL CAPACITY
8 Pamba-Kakki (2nd stage)
9 Idikki
10 Kuttiadi
11 Silent Valley
12 Pooyamkutty
13 Edamalayar
14 Lakshmi
15 Poringalkuthu Right Bank
16 Lower Periyar
SCHEMES LIKELY TO BE TAKEN UP IN FUTURE
17 Manathody
18 Bhavani
19 Kakkad
20 Kallada
CANNANORE
KOZHIKODE
PALGHAT
TRICHUR
ERNAKULAM
KOTTAYAM
ALLEPPEY
QUILON
TRIVANDRUM
RBM

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433*
377
133

*433 377 into a useful commodity. If this is done, it is possible to visualize that from 1965 onwards the State can be made the seat of bulk hydro-power generation not only for meeting the requirements of its own development programmes, but also for export to neighbouring areas in the southern zone. During the coming decade activities in connection with power development should, therefore, be geared mainly to the need of achieving this objective.

*Prior to the Plans*

*433 377 655 7.5 The beginning of an extensive power supply system, utilizing hydro-power resources of the State, was first initiated with the establishment of the hydro-electric power station at Pallivasal in 1940. During the years of the Second World War the power system registered significant progress as a result of increased industrial activity in the State. Just prior to 1951, the State had developed a total installed capacity of about 33 MW, of which 14 per cent was in diesel stations and the rest in hydel projects. A 66 KV transmission system covered the State and power was distributed to about 28,000 consumers in 19[illegible] towns and villages.

*First Plan Period*

7.6 Out of a total Plan provision of Rs. 30.03 crores, the largest share (Rs. 11.4 crores) was allotted to the development of power. Four hydro-electric projects viz., Sengulam Project, the Poringalkuthu Project I Stage, Poringalkuthu Project II Stage and the Nariamangalam Project, were taken up. During the First Plan period, the Mattupatty Dam (of the Pallivasal Project) with a storage capacity of 1,900 million cubic feet was constructed for augmenting the summer flow to the Pallivasal hydel station. The installed capacity of the station itself was raised to 37.5 MW providing for an effective generating capacity of the order of 32.5 MW. The Sangulam Project was commissioned in 1954 with an installed capacity of 48 MW. The Poringalkuthu Project, I Stage, was almost complete by 1956, and the remaining two projects were taken up for execution only during the last year of the First Plan. By 1956, the generating capacity had risen from 28.5 MW in 1951 to 85 MW, and the energy generated from 151 million units to 350 million units. Besides this, the transmission network was further expanded and 744 villages were electrified. An additional 51,456 consumers were connected to the system. [365]

*Second Plan Period*

7.7 The share of power was quite large in the Second Plan allocations. Out of the total outlay of Rs. 87 crores, the allotment for power development alone was Rs. 23.45 crores.

7.8 The total expenditure on power was made up of Rs. 11.40 crores for hydro electric projects, Rs. 4.82 crores for extension of transmission lines and Rs. 7.23 crores for rural electrification-cum-distribution schemes. The physical targets aimed at under the Second Plan were as follows.

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*A. Additional Generating Capacity*

| | |
|---|---|
| (i) Poringalkuthu, I Stage | 24 MW |
| (ii) Poringalkuthu, II Stage | 8 ,, |
| (iii) Neriamangalam scheme | 45 ,, |
| (iv) Sholayar project | 54 ,, |
| (v) Panniar project | 30 ,, |
| TOTAL | *161 MW* |

*B. Transmission Lines and Sub-stations*

| | |
|---|---|
| (i) 110 KV lines | 388 circuit miles |
| (ii) 66 KV lines | 43 circuit miles |
| (iii) 110 KV sub-station | 4 nos. |
| (iv) 66 KV sub-station | 6 nos. |

*C. Rural Electrification and Distribution Schemes*

| | |
|---|---|
| (i) Villages to be electrified | 1,344 nos. |
| (ii) Additional consumers to be served | 105,260 nos. |

7.9 The capital investment in the Second Plan, till the end of the year 1959, was nearly Rs. 18.75 crores. Almost all the essential items of plant and equipment had to be imported for working the power schemes included in the Second Plan. The foreign exchange component of the cost is of the order of 45 per cent. The difficulties experienced with regard to the availability of foreign exchange during the early years of the Second Plan affected the progress of the planned hydro-electric schemes in Kerala. Further, pending a decision on the riparian rights of Kerala and Madras regarding the waters of Poringalkuthu and Sholayar, the execution of Sholayar hydel scheme had been delayed. Only the Poringalkuthu II Stage extension could be completed by the end of the Second Plan. The first two units of the Neriamangalam scheme, having a total capacity of 30 MW, were also installed. In consequence, as against a much higher target that is, 246.5 MW, the total installed capacity in the system reached only 147.5 MW as shown by the breakdown below in the table :

INSTALLED CAPACITY IN MW

| *Name of Station* | *At the end of the First Plan (By March 1956)* | *Addition during the Second Plan (1956-61)* | *Total (By March 1961)* |
|---|---|---|---|
| Pallivasal | 37.5 | Nil | 37.5 |
| Sengulam | 48 | Nil | 48.0 |
| Poringalkuthu I Stage | — | 24 | 24.0 |
| Poringalkuthu II Stage | — | 8 | 8.0 |
| Neriamangalam | — | 30 | 30.0 |
| TOTAL | *85.5* | *62* | *147.5* |

7.10 Owing to non-commissioning of the Panniar and Sholayar projects, sufficient water was not available for running the machines to their rated capacity either at Poringalkuthu or Neriamangalam. Consequently, by the end of the Second Plan,

*433 effective capacity was only around 84.5 MW. This will rise sharply with the execution
377 of Panniar ahd Sholayar schemes during the early years of the Third Plan.

655 7.11 The position at the end of the Second Plan was as follows :—

Transmission, Distribution and Rural Electrification schemes had made good progress. The works which were completed include:

- (*i*) the 110 KV Sengulam-Pallom-Kundra double circuit transmission lines and the 110 KV sub-stations at these places;
- (*ii*) the 110 KV Neriamangalam-Alwaye-FACT double circuit transmission lines;
- (*iii*) the 110 KV Sholayar-Poringalkuthu double circuit transmission lines;
- (*iv*) the 66 KV single circuit line from Viyyur and Palghat; and
- (*v*) the 66 KV sub-station at Peermade, Thiruvalla, Alleppey and Vythilla and 33 sub-stations at Karumagappally.

Besides a carrier communication system linking all the generating and receiving stations and the headquarters of the State Electricity Board was completed and taken into service. [365] In the sphere of rural electrification, the benefit of electricity was further extended to 1,003 centres, additional 97,662 consumers were connected to the system and 57,282 street lights were installed in various parts of the State.

## GENERATION AND UTILIZATION OF ELECTRICITY

*433 7.12 Table 33[2] summarizes the progress of electric power generation and utili-
377 zation in the State of Kerala during the period 1954-55 to 1958-59. Some of the characteristics are worth noting. Of the total available electrical energy, about 20 per cent is lost in transmission and distribution or used for power station auxiliaries (all India 17.5%). Of the rest, as could be expected, industries are the most important consumers. They account for about 65 per cent of total electricity consumption in the State, the comparable proportion in the country being 50-55 per cent. Next in order of importance is domestic lighting which absorbs about 6.5 to 8 per cent (all India about 10%). The proportion of power used for irrigation has varied between 2 and 4 per cent of the total. Pumping out of water from the water-logged areas of Kuttanad is one of the main source of utilization of electricity in the sphere of irrigation.

7.13 Apart from these, two other important points may be noted : (*i*) Practically all the energy generated (97-98%) is from the hydro-electric power stations. This is in marked contrast to the pattern of power generation in the rest of India where roughly 55 per cent of electricity is from thermal sources. However, unlike the rest of India where it is necessary to have thermal stations to stabilize supply of power throughout the year, in Kerala because of an exceptionally well distributed rainfall and consequently assured supply of water over the different seasons, there is no such necessity and (*ii*) It is significant that the load factor has been steadily increasing during the recent years. The units generated annually per kW of installed capacity reached a figure of 4,400 during 1958-59 from 3,200 in 1954-55, that is, the load factor increased from 37 per cent to 46 per cent. Additional demand for power since 1954 has been met, almost entirely, by more intensive utilization of the existing capacity.

[2] [Table 33, appearing on p. 292 of the text, has not been processed--Analyst]

As explained earlier, the effective capacity could not be increased beyond 84.5 MW 433*
mainly on account of foreign exchange difficulties. 377

7.14 The relative shares of various consumers in the coming years will naturally depend on the pace of economic development. Nevertheless, it can be reliably forecast that the relative proportions will not significantly change and industry will retain its predominant place since it is expected that the industrial development will continue to be considered the pivot for economic growth of Kerala.

7.15 Per capita consumption of electrical energy in the State was about 27.75 kWh in 1959-60, which was slightly less than the all-India level of 30.45 kWh.

### *Regional Distribution of Electricity Facilities*

7.16 There is some imbalance in the distribution of electricity in Kerala. The 377
southern districts which were part of the former progressive State of Travancore- 184
Cochin, are more developed from the standpoint of industry and power, whereas the northern districts constituting the Malabar area are comparatively backward. The relative position of different districts in this regard is indicated in Table 34.‡

7.17 Similarly, the network of transmission and distribution lines also depicts a concentration of electrical facilities in the south or south-central region. Naturally, this has led to a clustering of industries in this area. However, it is possible to even out the position in future by undertaking the extension of transmission lines to the northern parts of Kerala as well. The present programme of extending 110 KV line to the north is a step in the proper direction.

### *Cost of Power Generation*

7.18 One of the outstanding features of power development in Kerala is the low 377
cost of generation. Generally investment per kW of installed capacity is higher 435
in the case of hydro schemes than in the case of thermal power stations. In Kerala, however, the figure for investment per kW of installed capacity is Rs. 750 to Rs. 900 for hydro schemes which is no higher than in the case of thermal stations. Most of the hydro sites are still unexploited and are ideally suitable for hydel generation. Since the catchment areas of hydel projects receive rain from both the south-west and north-east monsoons, the storage capacity required per kW of generating capacity is relatively small which in turn reduces the overall capital cost per kW. It is because of these factors that the initial investment normally incurred in case of hydro-electric schemes in Kerala, excluding transmission and distribution, is as low as Rs. 750 to Rs. 900 per kW of installed capacity against the all-India average of Rs. 1,500 to Rs. 2,000. Not only investment per kW of installed capacity is about the same for hydro and thermal projects in Kerala, the foreign exchange component of investment on hydro schemes up to generation, will also be of the order of only 25 per cent whereas in case of thermal schemes it is about 50 to 60 per cent.

7.19 Since the capital cost of hydro-power in Kerala is exceptionally low, the average cost of generation from the existing hydro stations is only 1.7 nP per unit. In the case of schemes under execution as well as the schemes already investigated,

‡[Table 34, appearing on p.293 of the text, has not been processed -- Analyst]

377 the cost of generation as estimated at present would rarely exceed 2 nP per unit. 435 As against this, the cost per unit of thermal power is estimated to vary between 6 nP to 10 nP for stations which are far from coal fields, as would be the case if Kerala were to go in for thermal generation. Table 35[2] presents some factual data regarding the cost of hydro-power generation.

377 432 7.20 Development of thermal power resources sometimes becomes necessary as a stabilizer for fluctuations in generating capacity of hydro dams caused by variations in the extent of rainfall. This problem does not arise in case of Kerala since a high level of rainfall which, in addition, is fairly well distributed over the year, is practically assured. As pointed out in another chapter, the co-efficient of mean deviation for annual rainfall in the case of Kerala is one of the lowest in the whole of India.

371 7.21 On account of these factors, electric energy from hydro resources would continue to occupy a predominant place in Kerala. The possibility of generating nuclear power within the foreseeable future can almost be ruled out for Kerala. Investment in nuclear power stations is of the order of Rs. 1,800 to Rs. 2,500 per kW of installed capacity, which is higher than those for thermal and hydro stations. Since Kerala has plenty of untapped hydro-power potential, the question of using nuclear energy does not arise.

## DEMAND FOR AND SUPPLY OF POWER

377 [439] 7.22 The simultaneous maximum demand, as recorded on the State electricity system, reached a peak of 94 MW during September, 1960. Over and above this, purchase from Madras State for Kerala system was about 8.6 MW and from Kerala to Madras was about 2.6 MW. So the net draw from the Madras system during September, 1960, was of the order of 6 MW. Hence the latest recorded demand on the State may be taken to be of the order of 100 MW during Sepember, 1960, as against the available firm capacity of 84.5 MW.

*433 377 7.23 In this context, an independent forecast may be attempted here on the basis of projections for industrial output made in the chapter on Industries. Factory sector is the main industrial consumer of electricity accounting for roughly 65 per cent of energy generated. The net output of factory industry is projected to increase from Rs. 24.4 crores in 1960-61 to Rs. 89.2 crores in 1970-71. In 1955-56, power consumption by industries corresponding to net factory output of Rs. 18.40 crores was 224 million kWh. In other words 1.24 units of electricity were used to produce one rupee worth of net output in industries. The corresponding ratio for the country was 0.8 kWh/Rupee. The relatively higher coefficient in Kerala reflects the more [328] power-intensive industrial structure. This is mainly due to the location of aluminium and other electro-chemical industries in Kerala.

7.24 According to NCAER's projections[1], the power intensity of industries may be expected to increase both as a result of the spread of power-using equipment and

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[113] [1] *Demand for Energy in India* (1960—75), NCAER.

[2] [Table 35, appearing on p. 293 of the text, has not been processed -- Analyst]

emergence of new power-intensive industries, from 0.8 kWh/Rupee in 1955-56 433* to 1.7 kWh/Rupee in 1970-71. Considering that power-intensive industries like 377 aluminium will not grow as fast as the other less power-intensive lines of manufacture, the power coefficient is not likely to increase as rapidly in Kerala as in the rest of India. Assuming that in 1970-71 2.0 kWh of power would be needed on the average to produce one rupee worth of output in the factory industry, the projected net output of factories in that year, viz., Rs. 89.2 crores would require about 1,750 million kWh.

7.25 Assuming that the industries still account for 65 per cent of total energy consumption, total demand for energy in 1970-71 would be nearly 2,700 million kWh. This corresponds to 675 MW of generating capacity considering that 4,000 of kWh are generated per kW of capacity. Simultaneous peak demand for energy by 1970-71 may be taken at 675 MW.

7.26 The probable phasing of this demand necessarily involves a certain amount of conjecture. If it is assumed that Kerala's power consumption increases at roughly the same rate as in all-India, the demand for energy would reach about 1,000 million kWh by 1965. However, in view of the fact that there is already unsatisfied demand for about 40 MW, and since the availability of power is one of the main means by which the State can attract industries, Kerala would be well advised to plan for a faster rate of power development during the next five years. Tentatively, simultaneous peak demand for 1965-66 is estimated to be 350 MW. Installed capacity may be about 15 per cent, higher than the simultaneous peak demand. The results are tabulated below :

| | *1965-66* (*MW*) | *1970-71* |
|---|---|---|
| Simultaneous peak demand estimated | 350 | 675 |
| Approximate installed capacity required | 400 | 800 |

The Kerala State Electricity Board has estimated that the demand for power within the State by 1965-66 will be about 365 MW. The installed capacity of 400 MW as suggested above should be adequate for this demand.

7.27 To meet a peak demand for 350 MW by end of the Third Plan and 675 by end of the Fourth Plan, installed capacities of 400 and 800 MW will have to be built up to have effective capacities equal to simultaneous peak demand. This will be the requirement of Kerala alone and any demand from the south zone including that of Madras State will have to be added to this figure to arrive at the overall installed capacities to be built up.

7.28 In the sphere of transmission it appears necessary to build a high tension trunk line of 110 KV or higher throughout the length of the State from north to south. This will facilitate interchange of power amongst various hydel stations and thereby help to reduce the standby capacity. This is also expected to bring down simultaneous peak demand in the State by taking full advantage of diversity in different loads. The State Electricity Board is already at work on this line.

## PROSPECTS DURING THE THIRD PLAN

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7.29 The total allocation of the Third Plan for the State is fixed at Rs. 170 crores and the outlay for power is fixed at Rs. 43.56 crores. According to the proposals for power development under the Third Plan, the implementation of the spill-over schemes of Panniar, Sholayar and Sabarigiri (Pamba-Kakki) will be the principal developmental activity during the Third Plan period. With the completion of these schemes, the installed capacity in the State will rise to 546 MW. Two new hydro-electric schemes, viz., Kuttiadi in North Malabar (installed capacity 75 MW) and Idikki Hydro-Electric Scheme (installed capacity 500 MW) are also proposed to be taken up during the Third Plan period. The Idikki scheme has been planned with the long range power requirements in view. Due to these continuing schemes, the total installed capacity available at the end of the Fourth Plan is expected to be about 975 MW.

7.30 An intensive rural electrification scheme has been programmed for the Third Plan. It will extend the benefits of electricity to about 750 more villages in the State. This, if fully implemented, will bring the total number of electrified localities to 3,100 by the end of the Third Plan. The distribution schemes during the Third Plan are expected to connect 100,000 new consumers and install 40,000 street lights.

## FUTURE OF POWER DEVELOPMENT IN KERALA

7.31 Three important factors have to be taken into account in considering the future of power development in Kerala. (*i*) In view of the heavy pressure of population on agriculture and acute unemployment in the State, rapid industrialization is essential which in turn requires an abundant low cost power generating capacity; (*ii*) shortfalls in the supply of electric power should be avoided or at least minimized during the next five years, and (*iii*) Kerala has not only abundant hydel resources but it is also possibly the only State in the South which is likely to have a surplus in hydro-power potential.

### *Zonal Intrgration*

7.32 Since during the next decade Kerala is likely to be the only power surplus State in the South, zonal integration should form the keynote of its power planning. It is expected that if implementation progresses according to Plans, by the end of the Third Plan period, Kerala will be able to have a surplus of power of about 150 MW over its own requirements. This will gradually go down until the spill-over schemes in the Fourth Plan start materializing. This surplus of 150 MW will then be steadily maintained and can be exported to the neighbouring State on a permanent basis so far as power development is concerned. Mysore and Andhra can, at best, remain on the fringe of self-sufficiency, at least for the next two decades, and Madras would have practically harnessed all its power resources by 1965-66. True, Madras has sizable lignite resources, but in view of manifold uses of lignite in industry, its utilization for

power generation will naturally be restricted. It is, therefore, essential that in the 433*
interests of the national economy, hydro-power generated at low cost in Kerala flows 377
abundantly, and in bulk, to Madras State.

## LIMITATIONS AND OBLIGATIONS OF EXPORT SALE OF POWER

7.34 The generation and export sale of the surplus electricity potential of the 433*
State, as a business proposition with a definite profit motive, just like any other industrial 377
undertaking, has certain limitations and obligations which should be understood in advance. 439
It is not as if this surplus generation places the State in a comfortable position of meeting any unanticipated demands of sizable magnitudes within the State itself at any time and gives it the option to export only whatever is in surplus to its needs from time to time. Export commitment is a definite contract and, except in the case of valid *force mejuri* conditions, contractual obligations have to be met even when there is an acute power shortage within the State itself due to normal causes of development. Electricity industry is capital-intensive and involves the use of sizable foreign exchange for capital equipment. Electricity projects also take a long time to materialize. In a planned economy for the country as a whole, the available resources are equitably distributed for maximum regional growth. Therefore, when the economic surplus power potentials of the State are exploited for export to the neighbouring State, on considerations of overall national economy, corresponding provision for power generation in the neighbouring State is at the same time avoided and it is made to depend on import of power for its needs. These long-term commitments have, therefore, to be firmly and clearly understood in advance.

### *Rates for Export Sale of Power*

7.35 Viewed as a commercial proposition, the maximum price which can be demanded for this exported power will have to be just less than what it would have cost the neighbouring State if it were left to its own costly thermal generation. In addition, the selling State should surrender a small prefixed margin of its profit to the purchasing State in order to make the purchase attractive and worthwhile. In the case of Madras, there can be no difficulty at all. It will have to pay for Kerala power what it pays for Neyveli power. There is also an added advantage for Madras in taking Kerala power at thermal rates. Neyveli will give only a firm power all through the year and can serve only as a base load station. Excepting the hydro stations in Nilgiris, all other hydel stations of Madras are tied up with irrigation regulations and the varying seasonal outputs have to be largely firmed up by an integrated operation of all these stations. There are limitations in this when seasonal power growth tends to assume sizable proportions and the full utilization of the seasonal discharges for power generation may not be possible. Luckily the position is different in Kerala. The large hydro potentials of Kerala are predominantly for power generation. Integrated operation of the hydel stations of Kerala with the Madras grid is possible and it can effectively firm up the seasonal power potential of Madras State. This will also

*433 result in mutual advantage to both the States and optimum exploitation and utilization
377 of the water resources of the region as a whole. Kerala can thus give Madras
439 varying power through all the seasons of the year and effectively firm up the seasonal
power potential of the State. This operational aspect has also to be kept in view while planning projects for an integrated operation and export of surplus power of Kerala to Madras. Hence, Kerala power at average kWh rates of Neyveli supply, is more advantageous to Madras than Neyveli power. It benefits Kerala also.

*Rates for Sale of Power to Consumers within the State*

*433 7.36 From the economic standpoint, the use to which power is put is just as im-
377 portant as its production. The two chief aspects of electricity consumption are: (*i*) Consumption of electricity as a factor in production in the field of industry, agriculture and traction. This can be termed "productive" power, or power in relation to productivity which activates the production and distribution circuits on which the increase of a country's wealth depends. (*ii*) Consumption of electricity for the direct, collective and individual needs of the people that is energy as a consumer good. This can be termed "non-productive" power.[1]

7.37 In Kerala, productive consumption (industrial power, irrigation and agricultural de-watering) formed about 85 per cent of the total in 1959-60 and non-productive power (domestic, light and small power commercial light, and small power public lighting and water works) formed the remaining 15 per cent. The domestic consumption alone came to about 10.7 per cent. The corresponding figures for all-India (1959-60) were 77.9 per cent (productive), 22.1 per cent (non-productive) and 11.1 per cent (domestic consumption alone). But this small percentage of non-productive consumption contributed much more (than its reasonable share to the total revenues) from the sale of power.

*433 7.38 For ready comparison, the consumption of energy distributed by Kerala
377 State Electricity Board to its consumer within the State (i.e., excluding bulk supplies
651 to Distributing Licencees and to the neighbouring Madras State) and the revenue
thereof are given in Table 36[2] for the year 1957-58. The statement is revealing.

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[1] "Productive" power helps to raise the standard of living of the community while "non-productive" power rather serves to measure the standard achieved. The rate-fixing policy must take into account these two distinct categories of consumption. Generally speaking, the policy should be one of cheap "productive" power for such productive cycles as would lead to a rise in wages so that it would then become possible for "non-productive" power to be sold at normal rates. In fixing higher rates for "non-productive" consumption, the ultimate objective of raising the standard of living of the community as a whole should not be lost sight of. The rate itself should not be unduly high to deny the service altogether to the bulk of the community living in an electrified locality. To this end, the rate fixed for "non-productive" power should also take into account the capacity of the community to pay. One of the objects of a sound rate-fixing policy would be to maintain within a given community a reasonable relation between "productive" and "non-productive" power consumption. Both in productive and non-productive uses of electricity where power replaces labour, power consumption will rise in proportion to its cheapness as compared to the cost of labour. In other words, the potential expansion of power consumption in a region may to a certain extent, be measured by the ratio of labour costs to power costs in the area. A policy of power expansion, if the costs remain high in relation to the cost of labour, cannot, therefore, achieve all the desired beneficial results; lowering of power costs, therefore, becomes more imperative where labour is cheapest.

[2] [Table 36, appearing on p. 299 of the text, has not been processed -- Analyst]

Eleven per cent non-productive consumption contributes nearly 60 per cent of the 433*
total revenue. This is much more than its reasonable share. This amount of sub- 377
sidy cannot be easily justified. Domestic consumption alone forms only a little over 651
7 per cent of the total consumption, contributes over 51 per cent of the total revenue from the sale of power. This is much too high a share.

7.39 There was a small, generally upward, revision of rates in December 1958, 433*
without materially altering the structure of the tariff. The above conclusions, there- 377
fore, still hold good. 435

7.40 Amongst the non-productive classes of load, item iv (Table 36) Public Water Works and Sewage Pumping is billed at "Industrial Rates" and classified as industrial loads for the purpose. In respect of item iii (Table 36) Public Lighting, the revised tariff of December, 1958 provides a rate of "15 nP per kWh for lamps for the first 6 hours of burning and 12 nP per unit for the remaining hours". This rectifies the high average rate per kWh in 1957-58, as seen in the above statement. The average unit rate per kWh of domestic consumption comes to as much as seven times the average selling rate of the total consumption through all categories of load. It is 15 times the average rate for productive consumption. The tariff revision of December, 1958 does not relieve this position. This is important. The structure of the domestic tariffs could induce optimum utilization of installed capacity with better load factor, but the domestic rates themselves have to be reduced substantially. In a State which leads the rest of the country in economic power generation, this should not be difficult. The "power surplus" position of the State can also enable the State to take effective steps to make cheap power (though costlier than productive power) available for domestic consumers extensively and may substantially raise the total domestic consumption to a higher level. In the light of the above observations, it is recommended that the State should review and revise its tariff policy for power sales.

## POSSIBILITY OF POWER SHORTAGE

7.41 It is learnt that power shortage is adversely affecting some of the existing 433*
big industries which are heavily dependent upon adequate power supply for their 377
full production. Besides, starting of new industries may be hampered unless adequate power supply is forthcoming, or at least, the present power shortage is removed.

7.42 A careful analysis of the power situation in Kerala shows that there will be no danger of a prolonged serious power gap. On the generation side, according to the present plans the Panniar Power Station with an installed capacity of 30,000 kW and the Sholayar Power Station with an installed capacity of 54,000 kW are expected to be commissioned in 1963 and 1964 respectively. Two of the six generating units of 50,000 kW each in the Sabarigiri (Pamba-Kakki) Power Station are also expected to be commissioned by the end of 1964 by which time the State will reach a very comfortable position in regard to power supply.

7.43 Any suggestion for setting up thermal power stations in the State to bridge the 433*
likely gaps in power supply will have to be examined in this context. As already 375
pointed out, thermal power generation costs more, both in terms of the cost of genera-

*433 375 tion and foreign exchange requirements. Besides, the construction of a thermal station even if immediately taken up, cannot be completed before two to three years. This time lag considerably reduces its value for alleviating the immediate problem of power shortage. Under such circumstances, there is no case at all for considering any thermal power stations in Kerala.

*433 377 7.44 At present, the best solution would be to arrange for the staggering of power load and to encourage the working of industries during the off-peak hours. Another possibility is that the Governments of Kerala and Madras may get together to alleviate the power problem of Kerala to whatever extent it is possible through the zonal grid.

## INVESTMENT REQUIREMENTS

7.45 Kerala's installed capacity by the end of the Second Plan was 147.5 MW. To build it up to 400 MW by the end of the Third Plan as suggested in this report an additional installed capacity of roughly 250 MW will be necessary. According to current estimates, approximately Rs. 1,600 per kW will be required in Kerala for generation, transmission and distribution. On this basis, about Rs. 40 crores will be required during the Third Plan. During the Fourth Plan, installed capacity is envisaged to increase from 400 MW to 800 MW. At the same rate of investment per kW as mentioned above, investment requirements for the Fourth Plan would be about Rs. 64 crores. Thus Kerala State would require the sum of about Rs. 104 crores over the Third and Fourth Plan periods to satisfy its own power needs. Requirements of neighbouring States for Kerala's power would require additional investment over and above this figure.

## CONCLUSIONS

7.46 The abundant water resources of the State, which can be utilized for generation of hydro-electric energy, form one of the strong points of Kerala economy. Apart from the large hydro-electric potential which is estimated to be of the order of 1,589 MW, the important feature of power resources of Kerala is the low cost of generation per unit. This is due to the favourable nature of the terrain and the high degree of rainfall which Kerala receives.

7.47 In the absence of any coal or oil deposits in Kerala or in nearby regions, hydro-electric power has to be the chief source of energy requirements of industry. The favourable position of Kerala in this respect should be utilized as a factor helping industrialization. For this purpose harnessing of the hydro-electric potential should be properly planned in advance so that an adequate amount of well-assured electric supply could be guaranteed to the industrialists. In this context the State would be well-advised to plan for a power surplus.

[439] 7.48 In view of the fact that Kerala is in a position to generate electric energy in ~~excess of~~ its requirements, while the neighbouring State of Madras has almost exhausted its domestic resources and Mysore and Andhra are just on the verge of self-

sufficiency, Kerala should play the role of a net exporter of electric energy to these States. 433
A zonal grid which is now planned to be laid in the South, is essential to make the most 377
economic use of the power generating potential of the Southern States. Since the cost 435
of electric generation is much lower in Kerala than in Madras or the other neighbouring
States even after including transmission costs, Kerala may also be in a position to earn
net revenue through export of electrical energy to the neighbouring States. This revenue could be utilized for capital formation within Kerala.

7.49 The State should review and revise its tariff policy for power sales specially 433
with reference to consumption of power for domestic purposes. 377
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## Chapter 8

# Transport

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433 IN THE CONTEXT of a developing economy, the transport system has a special role
489 to fulfil. Apart from opening up the country and linking all areas with each other, it has to meet the growing movement of raw materials on account of more rapid development of industry and rising levels of consumption and distribution. The particular relations of production, consumption and distribution obtaining in the State and changing, according to the emphasis of the Plans, entail certain
[262] characteristic tasks for the transport system of the State. In Kerala, for example the persistent food deficit of the State, necessitates movements of rice and other
[439] cereals by road and rail from adjacent States,[1] and foreign or coastal imports[2] through ports such as Cochin, Calicut or Trivandrum. Fish and fish-products are distributed from the ports by road, rail and waterways in local and inter-State interchange. From her fields and plantations orginate exports of coconuts, copra, pepper, ginger, cardamom, cashew kernels, tapioca, tea, coffee and rubber. The State's forests covering about a fourth of its area, furnish varieties of timber for clearance from one of the biggest timber markets in the world ; countryside distribution and foreign exports take place from Kallayi and Calicut. Exports of mineral ores, such as ilmenite, have to be handled from ports like Quilon or Chavra. The transport media serve continually, except for the interruption of the monsoon, in the carriage of raw materials, fuels, and essential construction and other goods such as cement, iron and steel, sugar and textiles. In particular, the transport network has to cater daily to the needs of industrial establishments, e.g., rubber and titanium factories at Trivandrum ; cashew industry at Quilon, the aluminium and ceramic industries at Kundara, paper and plywood factories at Trichur ; the coir and coir products of Alleppey ; the cement and sugar factories at Kottayam, the rayon factory at Perumbavoor ; the industrial complex at Alwaye comprising fertilizer, chemical, textile, glass and aluminium industries ; the saw mills and timber-based industries, soap, etc., in the Calicut area ; the big plywood factory at Baliapatam; the tile industry at Quilon, Trichur, Feroke, Calicut and other centres.

489 8.2 As regards passenger traffic, the Southern Railway carried 16.2 million passengers in 1959, the pressure of traffic being notable at Calicut, Quilon, Ernakulam, Alwaye and Trivandrum Central. The nationalized road transport services carried 65.3 million passengers in 1959. The passenger motor-boat services operating on the inland waterways carry 27,700 passengers daily. About 1,100 passengers

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[1] Over 800,000 tons.

[2] About 80,000 tons in a recent year.

embark and disembark every month at the two airports of the State in Trivandrum 489
and Cochin.

8.3 The State's transport system has to meet not only the requirements of the 489
internal movement of traffic and the needs of inter-State and overseas trade and 489
commerce of the State, but also the traffic connected with the import and export 439
trade of adjoining areas in the neighbouring States. Calicut and Cochin provide suitable inlets and outlets for the intake of oil fuels, cotton, hardware and machinery, fertilizers and foodgrains, and for exports of tea, coffee, etc.

*The Transport System* 489

8.4 The transport system of the State consists of:

*A.* Sections of the Southern Railway, 543 miles long; (broad gauge 331 miles; metre gauge 204 miles; mixed gauge 8 miles), serving port-towns such as Cochin, Quilon and Calicut, and other important industrial centres.

*B.* A road network made up of national and provincial highways (1,432 miles) and district and village roads (9,307 miles).

*C.* A unique inland waterway system of navigable rivers and coastal and cross canals, 1,178 miles long.

*D.* Thirteen ports, including a major port at Cochin, and two active minor ports at Calicut and Alleppey.

*E.* One hundred and eleven statute miles of airways, with airports at Trivandrum and Cochin.

8.5 Nearly 145,000 persons,[1] constituting 2.93 per cent of the working force [464]
of the State are engaged in transportation and account for an annual income of [434]
Rs. 8.697 crores.

8.6 The features of this system, particularly in relation to the physical and [433] *
financial (investment) demands that the growth of the State's economy may make on it in the coming decade (1961–71) are highlighted here for each medium of transport.

## THE RAILWAYS

8.7 In relation to the extent of area served (14,992 sq. miles), the railway mileage 496
per 100 square miles of State territory (3.6 miles) compares favourably with all-India 171
(2.7 miles) and Mysore (2.2 miles); Madras State is better served with 4.4 miles per 100 square miles. The railway mileage per 100,000 of population in the State is however, only 3.4 miles, slightly less than a third of what it is for all-India, viz., 9.5 miles. The corresponding figures for the adjoining States of Mysore and Madras
are higher being 6.2 and 5.6 miles respectively. The comparatively lower average 496

[Text continues on p.127]

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[1] 1951 Census figures.

MAP 11

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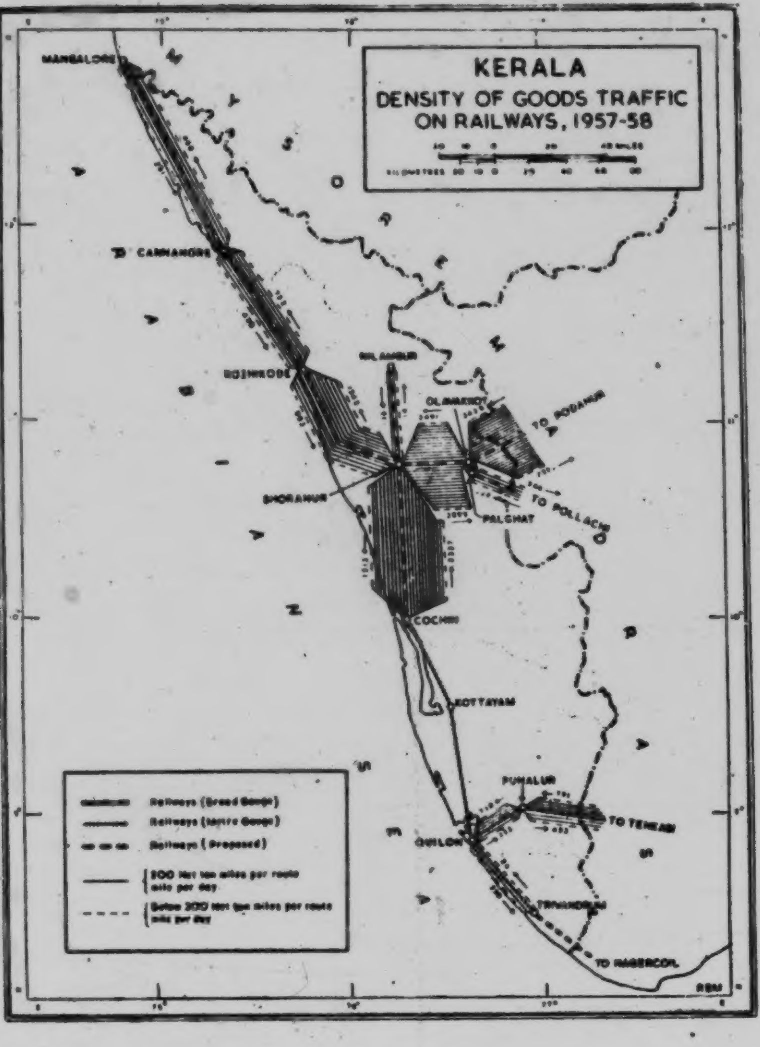
496
497


KERALA
DENSITY OF GOODS TRAFFIC ON RAILWAYS, 1957-58
MANGALORE
CANNANORE
KOZHIKODE
NILAMBUR
OLAVAKKOT
TO PODANUR
SHORANUR
PALGHAT
TO POLLACHI
COCHIN
KOTTAYAM
PUNALUR
TO TENKASI
QUILON
TRIVANDRUM
TO NAGERCOIL
MYSORE
MADRAS
ARABIAN SEA
Railways (Broad Gauge)
Railways (Metre Gauge)
Railways (Proposed)
200 net ton miles per route mile per day
Below 200 net ton miles per route mile per day
RBM

for Kerala is to be ascribed to the State's high density of population.[1] Within the 496
State, the districts of Quilon, Palghat, Calicut, Trichur and Cannanore are more favourably placed with regard to railways than others. Alleppey, which is least provided with railway mileage and facilities, and the districts of Kottayam and Ernakulam make up for their low railway mileage through roads and extensive waterways.[2]

8.8 The region south of Ernakulam and Cochin is served by the metre gauge line, and the region north of these by broad gauge. There is break of gauge in Ernakulam, involving transhipment of through traffic moving north or south as the case may be. Cochin harbour, however, is served by both gauges, the metre gauge giving access to the south, and the broad gauge to the north, and north-east of the State as well as the adjoining areas of the Madras State.

8.9 As the main railway line from Trivandrum to Kasargod lies almost all along the coast, except for the section between Ernakulam and Karthikapalli on the Ernakulam-Quilon section, railway facilities are not within easy reach of the eastern border areas of the State. Also a potential traffic route from Trivandrum to Tirunelveli *via* Nagercoil and Cape Comorin remains untouched by the railways.

8.10 On many sections of the railway within the State there is spare line capacity 497
(Table 37).[3] Though at present Cochin-Shoranur section has some spare line capacity, it may be called on to handle considerable increases in traffic, requiring additional line capacity. In the hinterland of Calicut Port, however, there appears to be enough capacity to cope up with additional demands that industrial and port developments there may generate.

8.11 In the railway sections within the State, the traffic is not balanced. The inward (or import) movements generally trend to exceed the outward (or export) movements as measured by net ton miles per route miles, per day. The imbalance has been maximum on the Cochin-Shoranur line and had tended to increase. However, since 1955–57, the imbalance has tended to reverse its direction. Shoranur-Calicut, Shoranur-Punalur, Quilon-Trivandrum Central, Punalur-Quilon are other sections where imbalances may be observed. The twin problems of additional demands on line capacity and uneliminated imbalance of traffic are both likely to show up together on the Cochin-Shoranur line, as the traffic to and from Cochin harbour registers an increase.

8.12 The pressure of passenger-traffic bookings, already heavy at Calicut, Quilon, Ernakulam, Alwaye and Trivandrum Central, is likely to get very much accentuated since these are precisely the locations where growth of urban concentrations is likely to come about with the development of the new industries proposed by the National Council for the decade 1961–71.

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[1] The backwardness is compensated by waterways, coastal movement and a working road and road transport system.

[2] The regional provision of railways is as follows:

| | *Mileage per 100 sq. miles* | *Mileage per 100,000 population* |
|---|---|---|
| Travancore-Cochin area | 3.13 | 2.56 |
| Malabar area | 4.22 | 5.08 |

[3] [Table 37, appearing on p. 294 of the text, has not been processed. – Analyst]

*
433
499 8.13 The programme of investment in the rail facilities in the State was estimated to cost Rs. 1.015 crores during the Second Plan. Till early 1960 it seems only about one-third ( 34.3 % ) of this amount had been spent. Major items of expenditure were on re-railing of track in the Shoranur-Calicut section, provision of metre gauge facilities at Cochin harbour and conversion of a number of stations into crossing stations and improvements therein. But progress was not substantial on account of non-arrival of materials, etc. Line capacity works were undertaken on the Punalur-Quilon section, increasing the number of trains from 11 to 12 and the net ton miles by 1.24 million. Additional loops were provided at Calicut, which helped to reduce detention of trains at adjacent stations. Additional platforms, goods sheds and marshalling yards were provided at Quilon to receive and assist the traffic on the new metre gauge link with Ernakulam. Engineering and traffic surveys for a new line from Tellicherry to Mangalore *via* Coorg were completed. Proposals relating to alignments between Trivandrum and Tirunelveli *via* Nagercoil and Cape Comorin are stated to be under consideration of the Railway Board.

## ROAD NETWORK

491 8.14 The total road mileage in the State at 10,739 miles (Table 38)[2] exceeds the figure of the mileage calculated in accordance with the Nagpur Plan Formula. The State has 71.6 miles for 100 square miles, as against 26 miles, derived from the Nagpur Plan Formula. However, the road system is not without certain shortcomings, such as those resulting from the uneven distribution of the total mileage among different districts and regions of the State (Table 39).[3] Calicut district and, in a lesser degree, Trichur district have fared rather poorly whether judged in relation to the extent of area served or mileage per 100,000 of population. There are considerable regional disparities between Malabar and Travancore-Cochin.[1] While the former has 61.9 miles of road per 100 square miles of area and 73.5 miles of road per 100,000 of population, the corresponding figures for the latter are 79.6 and 65.2 miles respectively. The area north of Alwaye-Munnar road presents an unsatisfactory situation in respect of road mileage. As Malabar is also relatively not so well-endowed in respect of inland water transport communications the comparative deficiency of road mileage is all the more significant in this area.

8.15 A number of factors reduce at present the maximum economic usefulness of the State's comparatively high road mileage. Among these may be mentioned (*a*) the absence of bridges on many roads (*b*) the weakness of existing culverts and bridges (*c*) poor surfacing (*d*) narrow width even on high traffic density routes (e.g. Trichur-Vadakkancheri, Malapuram-Hitchcock memorial in Calicut) (*e*) tortuous alignments, e.g., along Aroor-Ernakulam route (*f*) delays to traffic owing to reliance on road-cum-rail bridge (Ankamali-Trichur section of the Highway) and (*g*) saturation

[Text continues on p.130]

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[1] Particulars are set out in Table 6 of the NCAER appraisal report on Transport in Kerala.

[2], [3] [Tables 38 + 39, appearing on p.295 of the text, have not been processed -- Analyst]

[P.129]

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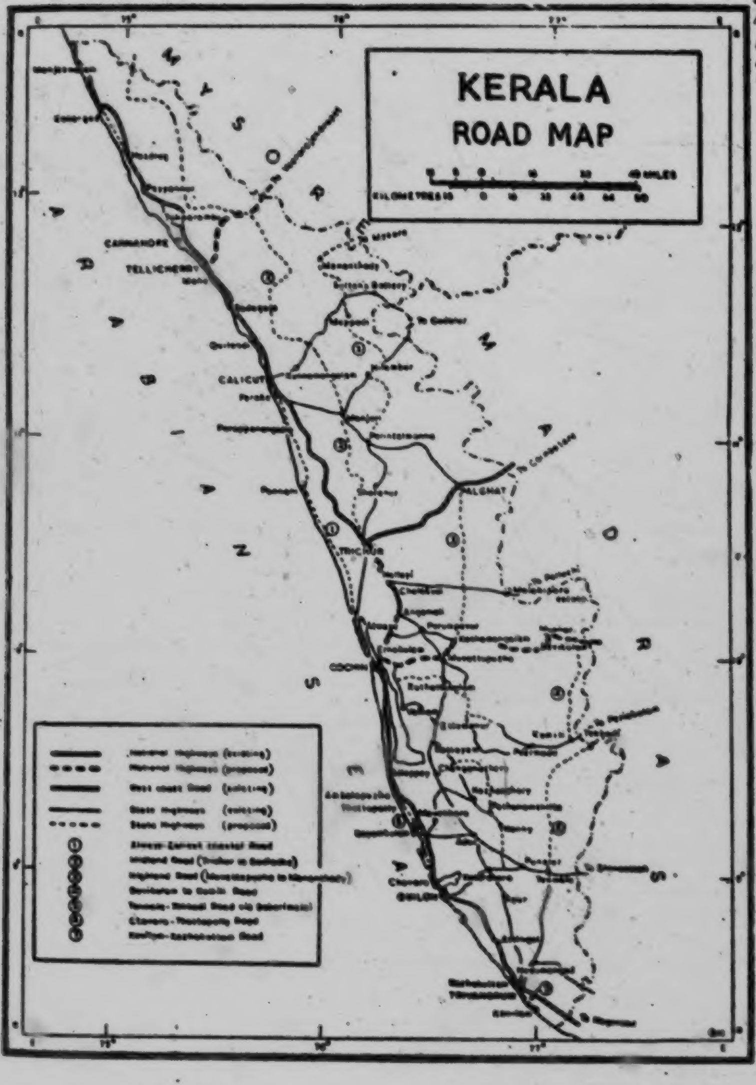
MAP 12


KERALA
ROAD MAP
MILES
KILOMETRES
MYSORE
MADRAS
ARABIAN SEA
CANNANORE
TELLICHERRY
CALICUT
PALGHAT
TRICHUR
COCHIN
QUILON
TRIVANDRUM
National Highways (existing)
National Highways (proposed)
West coast Road (existing)
State Highways (existing)
State Highways (proposed)

491 of traffic on arterial routes (e.g., Coimbatore-Cochin). The opening of Aroor Bridge has failed to attract the high potential of traffic expected between Quilon and Ernakulam, as there are weak bridges at least at three points on the route. As a result of lack of bridges, inter-State traffic between Kasargod and Mangalore has to *[433] seek a diversion *via* South Coorg. Apart from this, the need for bypasses, which is felt today in and near Calicut, is likely to become an urgent necessity around every focal point of increased industrial growth, such as Ernakulam, Quilon, Alwaye, Palghat, Trichur, etc.

*433 491 8.16 Special mention may be made of two vital routes:

(*i*) *Cochin-Coimbatore Road* (*N.H. No. 47*). This road has already become fully saturated with traffic passing between the port of Cochin and the Coimbatore area. The opening of the Mangalapuzha bridge over the Alwaye river has contributed to this saturation to a great extent. Future industrial development and increased traffic at the Cochin port would require the reservation of this road (N.H. No. 47) for fast moving traffic with an additional lane. Infact, even to cater to the present needs, such an arrangement is necessary. Slow moving traffic will have to be diverted to an alternative route from Trichur to Coimbatore *via* Kollengode and Palghat.

(*ii*) *Aroor Bridge—Ernakulam Road*. This length of 9½ miles of the National Highway is tortuous and incapable of being widened. If it is to cope up with the expanding activities of Cochin area, it will have to be realigned, even before the ship-building yard is located in Cochin. The best plan would be to reclaim land along the coast from Aroor bridge to the site where a bridge is proposed to be constructed near the Thevara College at Ernakulam approximately a distance of four miles, and divert the road on to this reclaimed land; the reclamation will have not only to provide for a road of about 70 ft. width, but could also be used to build a chain of warehouses which are very much in demand. A water frontage to handle the water-borne traffic on this entire four-mile route will also have to be constructed.

## ROAD TRANSPORT

493 8.17 The number of mechanized road vehicles in the State—trucks, buses, taxies, private cars, auto-rickshaws, etc.,—has increased sharply from 9,395 in 1956-57 to 23,087 in 1959-60. The number of goods vehicles rose from 2,714 to 5,218, i.e., by 92.2 per cent. But their proportionate share declined, 28.9 per cent of the total number of vehicles, to 22.6 per cent. During the same period, the number of buses increased from 452 to 3,236, that is by over 600 per cent. The percentage to the total number of road vehicles in their case increased from 4.8 per cent to 14 per cent. Passenger transport has thus recorded a striking increase.

8.18 The State has a vehicle density of 2.14 per mile of road, 1.54 per sq. mile [171] of area, and 146.6 per 100,000 of population. The comparative figures for all-India and an industrially advanced State like West Bengal are as follows.

VEHICLE DENSITY

| | *Per mile of road* | *Per sq. mile* | *Per 100,000 Population* |
|---|---|---|---|
| Kerala | 2.14 | 1.54 | 146.6 |
| West Bengal | 1.20 | 0.92 | 111.1 |
| India | 1.20 | 0.32 | 104.0 |

493
171

Kerala comes up with the highest indices, but this is not surprising as the railway serves only certain limited areas and road transport has to serve the other areas.

8.19 Trivandrum and Calicut districts have the largest concentration of goods vehicles on the road; Alleppey, Ernakulam, and Quilon figure next. As regards the stage carriages, Trivandrum district has the largest fleet; Trichur, Ernakulam, and Calicut districts also account for large numbers of stage carriages but these are much smaller. The Coimbatore-Cochin route is saturated with goods traffic in cotton bales, fertilizers, planks, tea, tapioca, machinery, hardware, etc., particularly since the opening of the Mangalapuzha bridge replacing the Desom ferry. The traffic was expected to go up by about 50 per cent during 1961. Similarly the traffic between Calicut and Coimbatore, across the Palghat gap and between Calicut and Wynad (timber traffic) bound for destinations in Salem, Madras, Mysore, Tuticorin, etc., has been on the increase. As industrial developments presage considerable increase of traffic on these routes, problems of alignment, bridging, extra lanes, expressway sections, etc., may call for more investment and additional construction. 494

8.20 About 250 trucks are operating between Mysore and Kerala on inter-State routes. They are subject to the restriction that they may not operate on more than three important straight routes, not exceeding 300 miles in each State. Inter-State routing arrangements between Madras and Kerala are yet to be completed.

8.21 The business in goods transport in the State suffers from the preponderance of owner-operators of single trucks (1,717 operators). There are only five operators in the State who own more than 10 trucks. The predominance of the owner-operator of single trucks is likely to prevent the industry from obtaining the economies and advantages of enhanced efficiency resulting from better organization of road transport in the State. [422]

8.22 Among other features of the transport system special mention may be made of chronic over-loading of vehicles and the beginning of movement in truck-trailer combinations in order to circumvent difficulties arising from restrictions of weight over weak bridges and culverts. Study and analysis of road transport problems are rendered more difficult by the paucity of data regarding traffic, the absence of regular departmental road census of vehicles and traffic, etc. A limited degree of nationalization of goods transport by road has been introduced on the Cochin-Mannar route where 10 to 18 trucks carry tea from the estates to Cochin, and rice, manures and machinery from Cochin to the estates.

8.23 Despite an early start, the nationalized road passenger services have not made much headway. About 458 vehicles are on the road, covering 24.9 million miles annually, and carrying about 65.3 million passengers. The larger revenues resulting from increased traffic and higher fares,[1] have not improved the net profits of [652]

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[1] The revenues rose by Rs. 31 lakhs.

494 the services, which have declined from Rs. 23.8 lakhs in 1956-57 to Rs. 17.4 lakhs
652 in 1959-60.

8.24 The allotments during the Second Plan for the construction of roads and
499 bridges were Rs. 2.146 crores and Rs. 1.932 crores respectively. The expenditure on
491 roads and bridges in the first four years of the Plan amounted to Rs. 2.871 crores and
652 Rs. 1.041 crores. The expenditure on maintenance in the three years 1956–59 was
about Rs. 2.956 crores. The achievement in respect of road construction, improvement and upgrading and construction of major bridges lagged seriously behind targets in the fourth year of the Second Plan.

8.25 The Central Government's expenditure on the construction and improvement of national highways was as follows:

| | | |
|---|---|---|
| 1958-59 | Actual | Rs. 11 lakhs |
| 1959-60 | Revised Estimate | Rs. 32 lakhs |
| 1960-61 | Budget Estimate | Rs. 55 lakhs |

493 8.26 The number of buses and trucks rose sharply in the State during the four
494 years of the Second Plan; but particulars are lacking regarding the amount of public or private investment on vehicles. The nationalized passenger services planned to add 460 buses to the fleet, 300 for rehabilitation and new 160 for operating on a stretch of 400 miles of roads. If achieved, this would involve an investment of the order of Rs. 2 crores. Between 1956-57 and 1958-59 the capital at charge rose by Rs. 78.4 lakhs only.

## THE INLAND WATERWAYS

487 8.27 The inland waterways of the State comprise: (*a*) the west coast canal system, stretching continuously except for a land-locked break between Azhikkal and Badagara (29.5 miles) a distance of over 347 miles from Trivandrum to Hosdurg; (*b*) cross canals, 387 miles long, mostly in the south of the State serving the commercial region in the midlands, and about 521 navigable miles in its various rivers. The Ashtamudi and Vembanad lakes provide extensive navigation facilities for traffic to and from Alleppey, Kottayam, Quilon and Cochin.

8.28 The waterways present a variety of problems though none of them are
insuperable. These should be tackled systematically as the waterways promise
superior economic advantages. Natural limitations arise from weather and rainfall;
most rivers are navigable upto their middle reaches only during the period of the
monsoons. In many places they are narrow and shallow (e.g., on the Trivandrum-
487 Quilon route). Dredging is often insufficient and even the dredgers are unsuitable
503 for dredging the narrow sections. Tugging services are required in hazardous areas,
e.g., Pathiramanal-Munroe light area in the Vembanad lake. Bridges are often low,
as in Varkala and on the Trivandrum-Quilon route, and they do not permit operation,
particularly of passenger boats. Landing places have not been provided in many
places, and where they are, they are not maintained in proper condition for use. A
505 [686] great drawback of water transport is insecurity and pilferage of the cargo. The

The 433* 505

establishment of booking agencies and the introduction of insurance against loss or theft are crying needs of the water transport system of the State. Licensing rules have to be made uniform throughout the State; the levy of tolls at locks and toll stations in Malabar has to be abolished, the loss in revenue being made good by licence fees. The bulk transport of petroleum products, which is of the order of 72,000 tons annually, suffers from restrictions on licensing of tank-boats with wooden hulls. Since the traffic is likely to be doubled in 10 years the rules must be reviewed to see if they can be amended to suit local conditions, especially in the case of non-hazardous petroleum products. A considerable volume of traffic-potential is likely to be generated for the waterways by the proposed programme of industrialization. A proper organization answering to the anticipated demands for transportation by waterways is called for. 505

[501] 8.29 At present 25,030 country craft (registered tonnage 180,735), 466 motor-boats (registered tonnage 2,988) and 1,298 crafts are operating on Kerala's waterways. In spite of the shortcomings referred to above, about 2.3 million tons of goods are moved annually over the waterways. The approximate figures of tonnage between specific points are 1.35 million tons between Cochin and Quilon, 60,000 tons on the Trivandrum-Quilon route and about 990,000 tons in the area north of Cochin. Particulars of the growth of traffic in recent years are not available.[1]

8.30 Motor-boats carry about 27,700 passengers a day on 65 different routes, the length of journeys ranging from 6 to 77 miles. Of this traffic, about 15,000 passengers were carried daily by 146 powered boats operated by the Kerala Water Transport Corporation in the Cochin-Quilon area. The Corporation's fares were slightly higher than on the Valloms. The organization ran into difficulties and is being reorganized. The State ferry services, operated with 13 powered boats between Ernakulam and Cochin, have been incurring losses. But in view of the revised fares introduced recently, they are expected to work profitably in the future.

433* 503 8.31 The inland waterways were allocated Rs. 43 lakhs in the Second Plan in order to (*a*) construct the Alleppey-Shertallai Canal (*b*) improve the West Coast Canal from Trivandrum to Shoranur (*c*) construct the Badagara-Azhikkal Canal (*d*) improve canals in the Malabar area, and (*e*) carry out some minor works. In the first three years Rs. 23 lakhs were spent. As most of the funds were taken up in the execution of the Alleppey-Shertallai Canal Scheme, much was not done for the other schemes. Top priority is being given for improvements to the Cochin-Quilon section. The estimated cost for the Azhikkal-Badagara canal is Rs. 1.05 crores. As the proposed alignment involved deep cutting at several places, a new alignment is being worked out for execution in the Third Plan.

## THE PORTS

8.32 The coastal and foreign traffic of the State is handled at Cochin, Alleppey, Calicut and 10 other ports of the State. The major port of Cochin dominates all 504 505

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[1] However, in section 8.42 the rate of growth of traffic anticipated during 1961—71 is indicated.

504 transport activities of the State. About 240,000 tons of imports and 310,000 tons
505 of exports of the State are handled, mostly in stream, and carried to and from the port by the inland waterway system. The role of the port and of the inland waterway system as a feeder in the transport activity of the State is likely to grow along the lines outlined in a later section.

*433 8.33 Studies made by the Intermediate Ports Committee show that Neendakara
504 which is six miles north of Cochin, can, if developed, serve the industries in the Quilon-Kundara area to the extent of an annual traffic of 400,000 tons comprising cashewnuts, ilmenite, etc. Koilthottam, at present handling the ore traffic, may stabilize its present traffic. Industrial developments around Calicut, such as the rayon pulp industry expected to come up at Mavur, may push the traffic at that port to over half a million tons by 1971.[1]

8.34 Several improvements were made at the Port of Cochin. With continuing increase in the import of oil, two tanker berths had to be constructed at a cost of Rs. 17.4 lakhs at Ernakulam channel to ensure safety and quicker turn-round. The pipe-line leading to the shore installations was commissioned in 1956. Three of the four additional wharf berths provided with crane, railway track, transit sheds, warehouses, open stacking space and other facilities at an estimated cost of Rs. 2.96 crores are almost ready.

8.35 Total expenditure on the development of minor ports of the State was expected to be Rs. 22.6 lakhs in the Second Plan.

489 8.36 Pending more detailed information regarding actual investment expendi-
652 ture between 1956-57 and 1960-61, it may be estimated that the investment in the State in the Second Plan on transport–railways, roads, bridges, buses, inland waterways and ports, was about Rs. 11.14 crores. It appears that in the first four years of the Plan the actual expenditure was about Rs. 7.18 crores, i.e., about 64.5 per cent of the financial allocations had been spent. In the Third Plan period and in the Fourth, every effort must be made to fulfil as nearly as possible the physical and financial targets, as transport arrangements must be ready in advance to receive the anticipated volume of traffic without creating bottlenecks.

## AIR TRAFFIC

509 8.37 The airports at Trivandrum and Cochin are served daily by a
[508] clockwise and an anti-clockwise service touching (*a*) Madras, Trichy, Madurai, Trivandrum, Cochin and (*b*) Coimbatore, Bangalore, Madras and Cochin. Cochin is also served by a daily service from Bombay *via* Belgaum. About 400 passengers travel every month by each of these services. About 350 passengers travel from Cochin to Belgaum and Bombay every month and 70 between Bombay and Trivandrum *via* Cochin or Bangalore. The prospects of this traffic are being studied at present by the National Council

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[113] [1] For particulars of a detailed assessment of traffic prospects at Calicut, Beypore vide *Report of Traffic Survey of Beypore*, NCAER, 1962.

for Indian Airlines Corporation.[1] 509

8.38 The absence of an air-link between Calicut and Trivandrum is being keenly felt, as other forms of travel including railways to and from Kerala's capital involve [489] a long and time-consuming journey with the difficulties attendant on the break-of-gauge at Ernakulam.

## ECONOMIC DEVELOPMENT AND TRANSPORTATION DEMANDS IN KERALA DURING 1961-71

8.39 An assessment of traffic that the implementation of the programmes proposed 433* elsewhere in this survey will generally indicate that an additional overall traffic of 489 5 million tons can be anticipated during 1970-71. The nature, magnitude and composition of the anticipated traffic are set out in Table 41.*

8.40 The estimate does not take into account traffic in certain items, for example, coconuts and certain types of consumer goods. An allowance of 10 per cent may be made for these omissions. Further, the transport system of the State, besides meeting the additional demands of its own traffic, will have to bear the burden of traffic of other States, such as Madras or Mysore, which is handled for them at Kerala's ports[2] and on roads and railway sections[3] within the territory of the State; the additional traffic on this account may amount to 1 or 1.5 million tons by 1970-71. The overall growth in traffic may thus be between 60 and 65 per cent over the present level.[4] The transport arrangements in the State have thus to be planned and developed to meet an additional traffic of 6.5 to 7 million tons by 1971.

8.41 There may be some changes in the character of the traffic. For instance, there may be a decline in the traffic in firewood by about 100,000 tons as oil and other fuels are coming in as substitutes. Changes in technology in the Fourth Plan period presage the disappearance of the traffic in gypsum (145,000 tons) to Alwaye and substitution by imports of sulphur (100,000 tons) *via* Cochin. Decline in foreign imports of foodgrains is anticipated, while increased imports from more distant sources inside the country are envisaged.

8.42 The distribution of the State's additional traffic between different media (including the demand for ports' services) as anticipated, is presented in the table below. The heavy dependence of Kerala on the import of materials for industry from [439] outside is reflected in the preponderant inter-State rail traffic. By 1971 the increase in the rail traffic in the State over its traffic in 1958-59 may be about 60 per cent.[5]

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[1] An Air Traffic Survey has since been completed by NCAER for the Indian Airlines Corporation. Besides estimating the traffic potential of the circular route in the Southern Region, the Survey has recommended air linking of Calicut, inclusion of Trivandurm in the Madras—Tiruchirapalli, Madurai—Colombo air route, location at Thirukakara of an airport for Cochin and Alwaye, terminal facilities at the Cochin Airport, etc.

—Vide *Air Traffic Survey—Southern Region*, NCAER, 1962

[2] Predominantly at Cochin.

[3] Mostly on the highway and railway section between Ernakulam and Shoranur.

[4] The current traffic by road, rail and waterways is estimated at 10.8 million tons.

[5] The cross traffic to or from Cochin and from or to other States is taken into account.

*[Table 41, appearing on p. 296 of the text, has not been processed--Analyst]

&

11: India G-4, 5 (1960-1961) 1962 AWll Kerala AWll

*433
489

### ADDITIONAL TRAFFIC ANTICIPATED BY DIFFERENT TRANSPORT MEDIA IN 1970-71

(In thousand tons)

| | |
|---|---|
| Railways | 2,337 |
| Road transport[a] | 1,859 |
| Waterways[a] | 1,126 |
| Ports[b] | 1,367 |

[a] Includes feeder traffic.

[b] Coastal and foreign traffic included.

8.43 The intra-State road traffic may be expected to register significant gains whereas the inter-State is likely to be steady: the decline in inter-State foodgrain movements by road may be somewhat counter-balanced by anticipated industrial traffic. The waterways are likely to compete for traffic going by road especially in low-rated commodities (sand, limeshell, ores), as well as in those which are conveniently handled at the ports either alongside berths or in midstream (e.g. petroleum, foodgrains imports, etc.).

[504] 8.44 The State's demand for port services in coastal and foreign trade is expected to go up by about 1.37 million tons by 1970-71. The services are likely to be required particularly at Cochin, Calicut and Neendakara-Quilon. At Cochin and Calicut the demand for port services will be further reinforced by the growing needs of the hinterland in Coimbatore and Nilgiri districts of Madras. The railway link with Cochin may require further additions to line capacity on the route to Alwaye, Shoranur and Coimbatore.[1]

8.45 The distribution of additional traffic among the ports of Kerala, as anticipated for 1970-71, is set out in table under para 8.42. The figures given in the table are approximate estimates based on requirements of port services of various industries suggested by the National Council. Only detailed traffic surveys can establish close and reliable estimates, allowing for such factors as traffic-potential in the hinterland, beyond the State boundaries, if any, and traffic gains or losses resulting from diversion from or to other ports. In the case of Cochin, imports are likely to be very predominant, foodgrains, petroleum products, and chemicals figuring prominently. Such gains as are likely to be achieved in exports may be in chemicals, plantation products, etc. As regards Calicut, the requirements of the newly coming up rayon-pulp factory is likely to be an important factor responsible for the import of machinery, fuel oil, coal and coke, and the coastal export of rayon pulp. Neendakara-Quilon ports are likely to receive impetus from developments in Kundara, Quilon, etc.

8.46 The effect of regional industrial developments within the State on the traffic by inland waterways is indicated in Table 42.[2] Intensification of traffic between Alwaye and Cochin, Cochin and Quilon, Tiruvalla, Kottayam and Alleppey may be expected. The growth of traffic upto the potential indicated will depend upon the maintenance of navigability in the waterways, and removal of a number of handicaps listed in para 8.28. 433* 489

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[1] The extent to which imbalances of traffic on these and other lines of the State are likely to be affected by anticipated growth of traffic to and from the State between 1961 and 1971 is to be separately surveyed and assessed.

[2] [Table 42, appearing on p. 296 of the text, has not been processed—Analyst]

## CONCLUSIONS

8.47 The conclusions that follow from the general traffic pattern outlined above are (*a*) accessions to traffic may be expected just in those areas and routes where it is strikingly high already (e.g., Cochin-Shoranur), (*b*) spare transport capacity on many railway sections will be absorbed, (*c*) the road, rail and waterway links to the ports may need improvement, and (*d*) further, the road transport capacity and terminal facilities should be increased to meet mounting demands.[1]

8.48 The railways have an important role to play, mainly in inter-State traffic and in helping the work of the ports. In the Third Plan, an investment of Rs. 1.2 crores i.e., of the same order as proposed and accepted but unfulfilled in the Second Plan may be necessary, mainly in connection with increase in the line capacity on vital routes (e.g., Cochin-Shoranur). If traffic and engineering surveys establish the economic feasibility of Trivandrum-Nagercoil-Tirunelveli line, it may be considered for the Fourth Plan. 433* 449

8.49 As the eastern regions of the State are untouched by the Railways and are likely to remain so, these have to rely mainly on road transport. It is necessary to extend, bridge, and improve the road network in these areas till at least 50 per cent of the targets set for 1981 are achieved by 1971[2]. The expenditure will be about Rs. 17 crores in the Third Plan and Rs. 26.3 crores in the Fourth Plan.

8.50 The Third Plan programme for roads and bridges in the State will cover the development of arterial routes and cross-roads in the north of the State (Rs. 4.32 crores), improvement of arterial routes in the south including the opening of Thenmala-Thekkadi road (Rs. 1 crore), the Vypeen Island Scheme (Rs. 1 crore), construction and improvement of about 3,600 miles of district and village roads (Rs. 5.996 crores) and the construction and improvement of 122 major and 584 minor bridges and culverts. Schemes spilling over from the Second Plan and costing Rs. 1.62 crores will also have to be completed. It is desirable to institute a road fund in the State to finance road development. The particular areas and routes where extension and improvements are possible in the next five years are set out in Table 43. The physical targets are indicated in Table 44.[3]

8.51 The number of trucks will need to be considerably augmented to cope up with the anticipated demands of traffic. The investment on trucks may amount to about Rs. 11 crores in the Third Plan and Rs. 10.29 crores in the Fourth Plan. The number of passenger buses may require to be increased by 2,400 in 10 years. About 4,600 buses may have to be replaced by the end of 1971. This would entail an expenditure of Rs. 20.5 crores. The State's Third Plan envisages the continuance of the 433* 493 494

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[1] Passenger traffic is certain to go up with rising population and concentrations of industry and trade at such centres as Trivandrum, Quilon, Kundara, Cochin, Ernakulam, Trichur, Palghat, Calicut and Cannanore but no estimate of the passenger service demands has been made here.

[2] Targets for 1981 as per formula of the Chief Engineers' Plan, Bombay (1960).

[3] [Table 44, appearing on p. 298 of the text, has not been processed--Analyst]

*433 policy of gradual nationalization. In the nationalized sector, about 560 additional
493 vehicles are proposed to be put on the road at a cost of Rs. 2.16 crores. Investment
494 on land, buildings and equipment is to be Rs. 87.7 lakhs. A Road Transport Corporation should be formed to run the bus service. The private sector will have to meet the residual road passenger needs.

*433 8.52 The recommendations of the Inland Water Transport Committee for the
503 development of the waterways of the State must be implemented since considerable traffic potential can be tapped for this transport medium at low cost. In order not merely to keep pace with but also to be ahead of industrial developments promising traffic, it may be necessary to invest even more than Rs. 2 crores in the Third Plan, as at present proposed. The improvements in navigability of the waterways north of Cochin, of the Cochin-Quilon and Quilon-Trivandrum routes and the cutting of the landlocked Azhikkal-Badagara section, are some of the items in the Third Plan budget for development of inland waterways in the State. Extensions of the waterways south of Trivandrum, and north of Hosdrug upto Mangalore, to connect up with the Mangalore-Coondapur canal works, will have to be taken up later on in the Fourth Plan.

*433 8.53 The State's current schemes for the development of Neendakara, Quilon
and Calicut and the recommendations of the Intermediate Ports Committee have
504 been taken into account in proposing an investment of Rs. 2.42 crores in the Third and Rs. 1.87 crores in the Fourth Plans. On account of anticipated demand for port-services by newly coming up or expanding industries in the State and outside, it would be wiser to provide initially higher investments in transport to keep ahead of the demand for traffic.

8.54 Port of Cochin can be expected to play an even more dominant role in the transport of the State as the economy takes off. An investment of Rs. 1.75 crores proposed to be incurred to improve facilities at Cochin Port during the Third Plan will benefit not merely Kerala but Madras and other States. It will add conspicuously to the State's transport capacity, created by the investments in roads, waterways and railways within the State.

[PP. 139-205 not processed]

## Chapter 11

# Manpower and Employment

## PART I: MANPOWER

464 ONE OF THE chief problems of Kerala today is the vast unemployed section of its 128 manpower. An appraisal of the analysis of employment prospects, therefore, becomes very important. The extent of urbanization, sex distribution, the size of the labour force, its rate of participation, and occupational distribution—all these are, therefore, studied in detail in what follows.

162 *Urbanization*

161. 11.2 Progress in urbanization in Kerala is less as compared to the country as a whole. Of the total population of Kerala, 13.5 per cent live in urban areas against 17.38 per cent for the whole of India according to the Census of 1951. The degree of urbanization has been progressively increasing over the past few decades. This is shown by the table below which gives the relative rates of growth of the urban and rural population during the period 1921–51. As may be seen, urban population has been growing at a faster rate than the rural population.

MEAN DECENNIAL GROWTH RATE OF POPULATION

(Per Cent)

| | *1921–30* | *1931–40* | *1941–50* |
|---|---|---|---|
| Urban | 27.18 | 23.26 | 29.38 |
| Rural | 22.85 | 16.53 | 20.12 |
| TOTAL | *23.31* | *17.27* | *21.22* |

N.B.: It may be noted that these figures pertain only to the old Travancore-Cochin State.

[112] SOURCE: *Census of India*, Volume XIII, Travancore-Cochin (Part I, Subsidiary Table).

11.3 During the last decade, that is, 1951–61, urbanization seems to have increased at a somewhat faster rate than in the whole of India. The proportion of population living in urban areas of Kerala grew from 13.05 per cent in 1951 to 15.03 per cent in 1961, whereas in the case of all-India the proportion registered an increase from 17.38 per cent to only 17.84 per cent.[1] In view of the plans for a faster growth of industries,

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[1] As pointed out in Chapter 1, too much reliance should not be placed on a comparison of urbanization between 1951 and 1961 since the definition of urban areas during the two Census operations has not been the same.

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the trend towards a high rate of urbanization may be expected to continue during the coming decade.

*Sex Distribution*

11.4 One of the interesting demographic features of Kerala is its sex distribution which shows an excess of females. Out of a total population of 16.88 million[1] in 1961, females (8.53 million) outnumbered the males (8.35 million) by 0.18 million giving a sex ratio of 1,022 females to a thousand males (all-India: 940 females to 1,000 males). The proportion of females in the population had been rising successively over the past few decades till 1951, but during the past decade it has shown a slight tendency to fall as shown by the following table:

SEX RATIO (KERALA STATE)

| *Year* | *Female per 1,000 males* |
|---|---|
| 1901 | 1,004 |
| 1911 | 1,008 |
| 1921 | 1,011 |
| 1931 | 1,022 |
| 1941 | 1,027 |
| 1951 | 1,028 |
| 1961 | 1,022 |

11.5 The excess of females is especially marked in the working age groups. Whereas in the age group 0-15 years males exceeded females in the ratio 100: 97.7, in the age group 15-55 years the position was reverse, there being 100 males to 106.5 females. (1951 Census) 162 [464]

11.6 The pattern of sex distribution in the rural and urban areas is broadly similar to that in the rest of India. Females are generally found to be more predominant in the rural areas. In Kerala this contrast is quite marked as can be seen from the fact that rural sex ratio is 1,034 to a 1,000 males against the urban ratio of 990 to 1,000. The cause of this rural-urban difference is rooted in the sociological factors, the most important of which is that the males generally come over to the towns for earning their livelihood, leaving behind other members of the family in the villages. [369] [166]

*Age Structure*

11.7 Age structure is an important determinant of the proportion of economically active persons in the population. An economy with a high proportion of older people is necessarily less dynamic than an economy with a large element of younger blood. Table 56[2] gives a comparative picture of the age structure of the population in Kerala and in India, according to the Census of 1951. 162 464

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[1] 1961 Census (Provisional Population figures).

[2] [Table 56, appearing on p.309 of the text, has not been processed--Analyst]

11.8 In the context of an under-developed economy like that of Kerala, it is difficult to define distinct boundary lines for the working age group, since participation in economic activity starts at an early age and at the other end of the ladder there is no fixed age of retirement. However, taking 15-55 years, as roughly representing the age group within which people actively take part in work, 53.3 per cent of Kerala's population belonged to this group against 52.4 per cent for all-India. It will also be noted from Table 56 that the working age group of the population in Kerala has a larger component of younger people than in all-India. A higher proportion of persons fall within the category of 15-25 years in Kerala while the reverse is the case with those in the age group 25-55 years.

## LIVELIHOOD CLASSIFICATION

11.9 The table below gives the comparative break-up of the population of Kerala and all-India according to the sources of livelihood (1951 Census data).

DISTRIBUTION OF POPULATION

| | *All-India* (in million) | *Percentage to total population* | *Kerala* (in million) | *Percentage to total population* |
|---|---|---|---|---|
| Total Population | 356.7 | 100.0 | 13.5 | 100.0 |
| Self-supporting Persons | 104.8 | 29.4 | 3.7 | 27.4 |
| Earning Dependents | 38.4 | 10.8 | 0.8 | 5.9 |
| Non-earning Dependents | 213.5 | 59.8 | 9.0 | 66.7 |

It will be noticed that the proportion of non-earning dependents is very high in Kerala. In fact, it is the highest in India with the exception of Madras. The burden of dependence, therefore, is very acute in Kerala.

*Working Force and Participation Rates*

11.10 The converse of a high rate of dependence is the low proportion of working force to the total population. Working force is defined as that section of the total population which takes part in productive activity. In terms of the classification in 1951 Census, the earners, that is, self-supporting persons and the earning dependents comprise the working force. The ratio of working force to the total population in any sector of the economy is defined as the sectoral participation rate.

11.11 According to the 1951 Census, Kerala had a total working force of 45.4 lakhs.[1] The general participation rate, that is, the rate of total working force to total population works out to only 33.5 per cent against a much higher figure of 39.9 per cent for the whole of India. Table 57[2] gives a break-up of general participation rate in terms of sectoral rates. This table reveals that it is the rural participation rate which is primarily responsible for this wide divergence between Kerala and India. Whereas Kerala's urban participation rate is only about 2 per cent less than the all-

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[1] *Vide* Appendix 2 for the method of calculation.

[2] [Table 57, appearing on p.309 of the text, has not been processed.—Analyst]

India urban participation rate, in case of rural participation rate, the difference is almost 8 per cent. 162 464

11.12 As a general rule the difference between rural and urban participation rates is about 6 to 7 per cent. In Kerala, however, this difference narrows down to 1.3 per cent. This is primarily due to an abnormally low rural participation rate, the causes for which are analyzed below. [369]

11.13 It was mentioned earlier that the population of Kerala has a very high proportion of females and that this is particularly marked in the working age group. Since the proportion of females taking part in economic activity is generally less than that of males, this difference being particularly marked in Kerala (Table 57), it naturally tends to pull down the participation rates.

11.14 The participation rate in the lower ranges of age is very much influenced by the proportion of school-going children. It is well known that the standards of primary education in Kerala are the highest in the whole of India. About 18 per cent of population attends schools and colleges against only 8.31 per cent in the whole of India. This is an important factor in reducing the rural participation rate. [871]

11.15 The size of working force is also a function of the opportunities available for work. The agricultural sector of Kerala is highly over-populated, the size of average holdings being only 1.5 acres (all-India 7.5 acres). Moreover, due to the predominance of perennial crops, cropping pattern in Kerala is much less labour-intensive than in the other parts of India.[1] That the agricultural sector of Kerala is comparatively less labour-absorbing is confirmed by the very low participation rate in the agricultural sector of Kerala in comparison to the non-agricultural sector. (Table 57). These are some of the factors limiting the scope for gainful employment in the rural areas. [423]

*Past Trend*

11.16 The table below gives an indication of the trend of the general participation rate as indicated from the last three Census operations : 161 162 464

TREND IN PARTICIPATION RATE—1931, 1941 AND 1951

| | *Population Density* | *Participation Rate** (In per cent) | *Total Population* (In lakhs) |
|---|---|---|---|
| 1931 | 634 | 48.0 | 95.2 |
| 1941 | 737 | 36.6 | 110.37 |
| 1951 | 905 | 36.1 | 135.6 |

*These figures have to be used with reservations since the concepts in successive Censuses were different. However, suitable modifications have been made to make them broadly comparable.

N.B.: Population density and population figures are for Kerala, while participation rate figures are only for Travancore-Cochin.

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[1] Chapter on Agriculture and Plantations.

162 464 The fall in the participation ratio between 1931–51[1] may be attributed to three factors:

(i) Rise in the sex ratio in favour of females.
(ii) Increase in the school-going population.
(iii) Slow growth in employment opportunities.

[161] [433] 11.17 The force of the first two factors, however, is not sufficient to explain the steep decline in the participation rate. A fall of the magnitude, as shown in the above table, primarily indicates that the increase in opportunities for gainful employment has not been keeping pace with the growth of population which had increased by over 40 per cent between 1931 and 1951 without any corresponding growth of industries or development in other sectors.

## REGIONAL VARIATIONS IN POPULATION DENSITY AND MANPOWER

[161] 11.18 Kerala is the most thickly populated State of India having an average density of 1,125 persons to a square mile according to the Census of 1961. The population, however, is not uniformly spread out as may be noticed from the district density figures in Table 58.[3] Malabar is less thickly populated than the Travancore-Cochin area. But the proportion of working force to total population, that is, the participation rate is also lower in the Malabar area. Generally, it is expected that participation rate would be lower in the more congested areas, because an over-crowded agricultural sector naturally offers limited scope for employment. The comparison of Travancore-Cochin and Malabar, however, seems to belie this conclusion. The [288] reason for this contrast perhaps lies in the fact that the major part of the coir industry, the most labour-intensive industry of Kerala, is concentrated mostly in the Travancore-Cochin region.[2] Absence of this industry on a large scale in Malabar seems to account for a lower participation rate in that area.

### *Occupational Distribution*

162 464 433 11.19 Occupational pattern generally gives a broad idea as to the stage of economic development attained by a country or a region. The distribution of working force between agricultural and non-agricultural sectors, is given separately for the rural and urban sectors, in Table 59.[4] A comparison with the all-India occupational distribution brings out a marked contrast in the case of Kerala. Whereas 71.8 per cent of the working force was engaged in agricultural occupations in the whole of India, in case of Kerala the proportion was only 51.4 per cent. In fact in Kerala the proportion of its population dependent upon non-agricultural activities turns out to be the highest in the whole of India.

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[1] The difference in the concepts used in 1931 and 1951 Censuses perhaps exaggerates the extent of decline in the participation rates, but it does convey some idea of the fast deterioration in the unemployment situation over the years.

[2] Both these aspects have also been dealt with in Chapter 1.

[3], [4] [see p. 310, category 116 -- Analyst]

11.20 As a general rule one associates a high proportion of working force engaged 162 in non-agricultural activities with a high level of industrial development. However, 464 the structure of industries and income contributed by industries[1] do not bear out 433 this contention. Moreover, the Census of 1951 shows that 75 per cent of the non-agricultural population lives in the rural areas. This only goes to prove that the major part of non-agricultural activity is not organized on the lines of modern large scale industry but is composed of occupations more allied to agriculture which are located in the rural areas.

11.21 Two factors, which have already been referred to in a different context,[2] seem to be responsible for this peculiar type of occupational structure. These are:

(i) *Predominance of Perennial Crops*: Over 40 per cent of gross cropped area is [241] covered by these crops (all-India 10%). Since these crops, once they are sown, require comparatively little labour for looking after them, tend to reduce the proportion of working force to the population engaged in agricultural activities.

(ii) *Small Size of Holdings*: Super-imposed upon this is the fact that the average [423] size of holdings in Kerala is very small. This tends to push people away from agricultural to non-agricultural avocations. Coir industry, which is mostly [288] located in the rural areas, is an important example of such non-agricultural occupations.

### *Changes in Occupational Structure*

11.22 Between the Census of 1931 and 1951 population dependent upon agriculture increased from 34.2 per cent to 53.84 per cent. It brings out one fact quite clearly. Although the non-agricultural sector is quite large in terms of its existing employment potential, it has not been dynamic enough to grow at a rate sufficiently large to absorb the growing population. One other consequence of a growing reliance on agriculture, in spite of the congestion already existing there, is the rising proportion of agricultural labourers to total population. Cultivation of owned land cannot [423] be expected to provide a reasonable source of livelihood for all the rural population, when as high as 50 per cent of family holdings are less than one acre in size. The proportion of agricultural labourers to total population, therefore, increased from 12.5 per cent in 1931 to 20.16 per cent in 1951.

## PART II: PROSPECTS OF EMPLOYMENT

### LABOUR FORCE AND UNEMPLOYMENT

11.23 Some indication has already been given of the high degree of unemployment 464 prevailing in the economy of Kerala. Before proceeding to make a quantitative assessment of the extent of unemployment, it is desirable to clarify the definition of

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[1] Chapter 9, Industries— Structure and Growth.

[2] Chapter 1 and Chapter 2.

464 some of the concepts used. Working force has already been defined as comprising all those persons who take part in gainful economic activity. Labour force, on the other hand, includes all those members of the population who are already engaged in gainful activity and those who are willing to take up work, generally at the current level of wages. The difference between labour force and the working force gives the magnitude of those who are unemployed and are actively seeking work.

464 128 11.24 Although these concepts are quite clear, according to definitions, their application in the context of a backward economy like that of Kerala is fraught with difficulties, which are by now quite well known. The seasonal and non-institutionalized nature of economic activity over a wide sphere of the economy creates problems in the way of precise quantification of unemployment. Statistical accuracy of the figures discussed below is naturally subject to these limitations.

464 659 11.25 The main source of information on this subject is the survey of unemployment for Travancore-Cochin and Malabar region carried out by the Statistics Department of the State. The survey was carried out in 1954-55 for the Travancore-Cochin region and in 1956-57 for Malabar. In the absence of figures for the same year, the combined results for the two different years are taken, by and large, to be representative of the situation as it existed during 1955-56.

162 464 11.26 Table 60 gives the combined results of the two surveys. According to concepts used in the survey, the total population has been divided into eight activity groups given in column 1 of Table 60. Persons falling in category 4, 6, 7, that is, (*i*) those having regular employment (*ii*) casual workers and (*iii*) the people in search of employment, make up the labour force. Category (7) includes the unemployed persons. The under-employed section of the population is covered by category (6), i.e., the casual workers.

11.27 According to this survey, labour force as a proportion of total population comes to 32.5 per cent (all-India: 42.2%[1]). The difference betweent labour force—population ratio as worked out from this survey and that revealed by the NSS for all-India is primarily due to a difference in the concepts used. The Unemployment Survey of Kerala does not include those below 15 years in the labour force. This assumption is quite justified in the case of a State like Kerala where most of the children [871] go to school. In 1955-56, 14.1 lakh children were registered on the rolls of primary schools. These form about 22 per cent of all the children below 15 years of age. Roughly the same proportion of children below 15 years belong to the labour force in the whole of India (according to the NSS Report). It may, therefore, be concluded that there are only stray cases of children below 15 years belonging to the labour force in Kerala.

11.28 Another way of working out the ratio between the labour force and the total population in the State is to calculate the working force on the basis of Census data and to add to it the number of unemployed persons as obtained from the Unemployment Survey in Kerala. On the basis of the participation rate of 33.5 per cent, working force during 1956 comes out to 50.3 lakh persons[2]. The number of

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[113] [1] National Sample Survey : *Report on Employment and Unemployment*.

[2] The manner of working out the working force for 1956 is explained in Appendix 1 to Chapter 1.

3 [see p. 311, category 116 -- Analyst]

actively unemployed persons during 1956 was 6.6 lakhs.[1] The total labour force 162
during 1956 may, therefore, be taken to be 56.9 lakh persons, i.e., 37.9 per cent of the 464
total population.

11.29 One striking feature revealed by this survey is the very high degree of open unemployment. Open unemployment comes out to be as high as 4.2 per cent of the total population, as can be seen from Table 60 (Category 7).[2] Generally it is under-employment rather than open unemployment which is prominent in backward agricultural economies. For example, unemployment in India is only 0.29 per cent of total rural population and 1.99 per cent in urban areas giving a weighted average of 0.58 per cent[3]. The percentage of open unemployment to population in Kerala is, therefore, roughly seven times as high as in the rest of India.

11.30 Category (6) of Table 60, that is, the proportion of casual workers to the total population gives an idea of the magnitude of the problem of under-employment. The incidence of under-employment is also higher in Kerala than in India. Of the total population, 9.6 per cent belongs to this category against about 6 per cent for the whole of India.[4] Among the under-employed section of the population, on an average, a worker was unemployed for about 2.35 days per week. This, however, does not tell the whole story. There are the seasonal variations which extend the period of unemployment to several days at a stretch.

11.31 The above figures do not include disguised unemployment. In rural 464
areas, where family enterprise is the dominant form of organization, there is generally [369]
a large surplus of hidden manpower which does take part in economic activity, but whose net contribution towards increasing the output is very little. An objective assessment of the surplus in disguised unemployment is rather difficult. It would have to rely heavily upon notional norms regarding optimum labour requirements among the self-employed sector of rural population. Within the coming decade the problem of primary importance, however, is that of providing jobs for the large backlog of unemployed, who sit completely idle, rather than for those who are in the comparatively favourable position of being employed but below their full capacity.

## RURAL-URBAN UNEMPLOYMENT

11.32 The nature of unemployment in rural and urban areas varies considerably. 162
According to NSS Report on 'Employment and Unemployment' (9th Round), open 464
unemployment in rural areas was rather insignificant affecting only 0.29 per cent 369
of the total rural population (urban areas 1.99%). Because of the small size of the sample, the unemployment survey referred to above did not collect separate data for rural and urban unemployment in Kerala. Under these circumstances, only rough

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[1] Table 60.

[2] It may be noted that in Table 60 the absolute number of unemployed persons is likely to be high since a portion of Travancore-Cochin, viz., Kanyakumari was transferred to Madras. However, the percentage figures may be assumed to be fairly correct.

[3] *NSS Report on Employment and Unemployment.*

[4] *Ibid.*

162 approximations can be made regarding the number of persons unemployed in rural
464 and urban areas.

369 11.33 There is reason to believe that the high incidence of open unemployment in Kerala is primarily due to high rural unemployment. The two basic reasons for this premise, viz., the very small size of holdings and predominance of perennial crops have already been explained. This conclusion is also corroborated by evidence from some other sources. During 1956 the number of unemployed persons registered with the Employment Exchanges was 38,988 persons.[1] A majority of those registering themselves with the Employment Exchanges generally come from the urban areas. It is believed that roughly 25 per cent[2] of the unemployed persons get themselves registered with the Employment Exchanges in India. In Kerala, the standard of literacy being very high, it may be assumed that a higher proportion (40%) of the unemployed get themselves registered. On this basis the total number of unemployed persons in urban areas would be about 0.95 lakhs. Out of the total unemployed population of 6.6 lakhs, about 5.65 lakhs must, therefore, be residents of rural areas. On the basis of these calculations, rural-urban distribution of the unemployed and the labour force for 1956 is given in the table below:

DISTRIBUTION OF UNEMPLOYMENT IN RURAL AND URBAN AREAS

(In Million)

| | | *Rural* | *Urban* | *Total* |
|---|---|---|---|---|
| 1. | Population | 12.9<br>(86%) | 2.10<br>(14.0%) | 15 0<br>(100%) |
| 2. | Working Force | 4.34 | .68 | 5.02 |
| 3. | Unemployed | 0.565 | .095 | .66 |
| 4. | Unemployed as Percentage of Population | 0.44 | .45 | .44 |
| 5. | Labour Force (2+3) | 4.905 | .775 | 5.68 |
| 6. | Labour Force as Percentage of Population | 3.80 | 3.69 | 3.786 |

11.34 It may thus be seen that unlike the rest of India the percentage of unemployed population in rural areas is not markedly less than that in the urban areas. In both areas it works out to about 4.5 per cent.

*Educational Standards of the Unemployed*

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11.35 Analysis of educational attainments of the unemployed population can be helpful in throwing light on the qualitative aspects of the unemployed. The impression one generally gets about Kerala is that unemployment is more severe among the educated persons. The results of the Kerala Unemployment Survey do not exactly bear out this contention. Only 6.8 per cent of those unemployed had been educated upto school leaving (SSLC) standard. The extent of technical education was even lower, only 2.5 per cent of the unemployed having received any form of technical education. It would thus appear that although a fairly large proportion of the unemployed may be literate, not many of them are educated, if ESLC is taken to be the minimum requirement for being defined as an educated person. [212]

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[1] *Basic Statistics—Kerala*, published by the State Department of Statistics.

[2] *NSS—Preliminary Report on Urban Unemployment* Sept. 1953.

11: India G-4, 5 (1960-1961) 1962 AWII Kerala AWII

*Supply of Labour*

11.36 In addition to the current back-log of unemployment, the two sources of 464
future labour supply would be : (*i*) growth of population, (*ii*) changes in labour force population ratio. Of these, by far the most important source will be the growth of population. Long run changes in the labour force population ratio are difficult to predict. For the comparatively short period of next 10 years, this ratio may be assumed to remain constant at about 37.9 per cent or so.

11.37 A look at the population figures in Kerala over the last few decades shows 161
that this State has witnessed a higher rate of growth of population than India as a whole and that during 1941–51 it was higher (22.82%) than in any other State.[1] There are indications to believe that the rate of growth of population during the coming decade may not be so fast. The following table gives the projections for 161
growth of population[2] and the labour force arising out of it during the period 1956–71. 464

GROWTH OF POPULATION—PROJECTIONS FOR 1956—71

| *Year* | *Population* (million) | *Increase in Population over the previous five years* (million) | *Increase in the labour force (Labour force population Ratio = 37.9 per cent)* (million) |
|---|---|---|---|
| 1956 | 15.01 | .. | .. |
| 1961 | 16.68 | 1.67 | .633 |
| 1966 | 18.34 | 1.66 | .629 |
| 1971 | 20.12 | 1.78 | .674 |
| | | | 1.936 |
| Backlog of unemployment in 1956 | | | .660 |
| | | | 2.596 |
| Less jobs created during the Second Plan | | | .200[*] |
| Additional labour supply during 1961–71 | | | 2.396 |

[*] *Employment Trends and Prospects*—Planning Commission. Approximate estimates of employment created during the Second Plan may also be derived from investment figures. On this basis we get a smaller figure for employment generated during the Second Plan period. Public sector investment during the Second Plan was about Rs. 75 crores. Adding 50 per cent for private investment the total comes to Rs. 112.5 crores. Assuming that an investment of roughly Rs. 8,000 is required to create an additional job, the number of jobs created during the Second Plan comes to about 1.4 lakhs. [113] [433]

11.38 The above figures may be taken to be only rough approximations, since the 161
projections of population and labour force ratios are based on certain assumptions. 464
However, the magnitude of the problem is well illustrated by the fact that during the coming decade an additional 23.96 lakh jobs will have to be created if something 433
approaching the standards of full employment has to be achieved. This figure is almost 50 per cent of the existing working force.

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[1] *1961 Census*—Provisional Population figures.

[2] Based on NCAER population projections. It may be noted that the NCAER projections would have to be slightly modified in the light of the 1961 Census data. However, the extent of difference would not be so large as to make any substantial difference to our calculations.

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## TABLE 2

### DENSITY OF POPULATION IN KERALA

| District | Population | Density per sq. mile |
|---|---|---|
| Trivandrum | 1,738,085 | 2,052 |
| Quilon | 1,929,845 | 994 |
| Alleppey | 1,809,530 | 2,545 |
| Kottayam | 1,730,436 | 745 |
| Ernakulam | 1,850,440 | 1,468 |
| Trichur | 1,634,251 | 1,422 |
| Palghat | 1,775,477 | 896 |
| Kozhikode | 2,619,285 | 1,283 |
| Cannanore | 1,779,852 | 649 |
| KERALA | *16,875,199* | *1,125* |

SOURCE: 1961 Census Provisional Population figures.

## TABLE 3

### ESTIMATE OF STATE INCOME OF KERALA (1955-56)

(At current prices)

434
433
171

| | Kerala | | India | |
|---|---|---|---|---|
| | *Rs. crores* | *Per cent* | *Rs. crores* | *Per cent* |
| *A. Primary Incomes* | *172.5* | *49.1* | *4,520.0* | *45.4* |
| 1. Agriculture | 151.3 | 43.1 | 4,300.0 | 44.9 |
| 2. Animal Husbandry | 10.7 | 3.0 | | |
| 3. Forestry | 5.0 | 1.4 | 70.0 | |
| 4. Fisheries | 5.5 | 1.6 | 60.0 | 0.5 |
| *B. Secondary Incomes* | *52.3* | *14.6* | *1,850.0* | *18.5* |
| 1. Factory enterprises | 18.0 | 4.8 | 780.0 | 7.8 |
| 2. Non-factory enterprises | 32.3 | 9.6 | 970.0 | 9.7 |
| 3. Mining | 2.0 | 0.6 | 100.0 | 1.0 |
| *C. Tertiary Incomes* | *126.8* | *36.3* | *3,610.0* | *36.2* |
| 1. Communications | .. | | | |
| 2. Railways | 3.5 | | | |
| 3. Other Transport and Commerce | 35.9 | | | |
| 4. Organized Banks and Insurance | 3.5 | | | |
| 5. Professions, Arts and Domestic Services | 31.3 | | | |
| 6. Public Authorities | 14.6 | | | |
| 7. House Property | 18.0 | | | |
| TOTAL | *351.6* | *100* | *9,980* | *100* |
| Population (millions) | 15.01 | | 383.0 | |
| Per Capita Income | 234.4 | | 261.0 | |

[Pp. 216–269 have not been processed]

## TABLE 4

### *SECTORAL EMPLOYMENT AND LABOUR PRODUCTIVITY IN KERALA (1955-56)*

464
433
162
171

| | *Working force* | | | *Net value added per worker (Rs.)* | |
|---|---|---|---|---|---|
| | *Kerala* | | *India* | *Kerala* | *India* |
| | *Lakhs** | *Per cent* | *Per cent* | | |
| 1. Primary Sector | 27.6 | 54.9 | 71.8 | 625 | 411 |
| 2. Secondary Sector | 9.7 (100%) | 19.3 | 9.4 | 539 | 1,294 |
| (*a*) Factory Enterprises | 1.7 (17.5%) | .. | .. | 1,059 | 2,500 |
| (*b*) Non-factory Enterprises | 7.8 (80.4%) | .. | ... | 413 | 915 |
| (*c*) Mining | 0.2 (2.1%) | .. | .. | .. | .. |
| 3. Tertiary Sector | 13.0 | 25.8 | 18.8 | 975.4 | 1,249 |
| TOTAL | *50.3* | *100.00* | *100.00* | *700.00* | *651.00* |

---

* Recently, the Statistics Department of the Government of Kerala conducted an Integrated Sample Survey. According to this, estimate of total employment in Kerala during 1957-58 was 46.3 lakhs. The difference between these estimates and the one given above are obviously due to difference in the concepts used. The concepts used here are based on classification adopted in the 1951 Census. For the purpose of this report figures based on the Census data are being used. Since Techno-Economic Surveys of other States have also used Census data for calculation of working force, the uniformity provided by this data possesses the advantage that it allows inter-State comparisons. The alternative estimates of employment structure in Kerala, as revealed by the Integrated Sample Survey are given below:

| | (In lakhs) |
|---|---|
| 1. Primary Sector | *24.5* |
| 2. Secondary Sector | *9.4* |
| (*a*) Mining | 0.5 |
| (*b*) Factory | 1.5 |
| (*c*) Non-factory | 7.4 |
| 3. Tertiary Sector | *12.4* |
| TOTAL | *46.3* |

659
128
162
464
433

5/1
369
171

## TABLE 5

### CONSUMER EXPENDITURE IN RUPEES PER PERSON BY ITEMS OF CONSUMPTION FOR PERIOD OF 30 DAYS IN RURAL AREAS

| *Items* | *Travancore-Cochin* | | *All-India* | |
|---|---|---|---|---|
| | *Expenditure level* (Rs.) | *Percentage* | *Expenditure level* (Rs.) | *Percentage* |
| Foodgrains | 6.10 | 32.7 | 8.70 | 4.06 |
| Milk and milk products | 0.43 | 2.3 | 1.35 | 6.3 |
| Edible oil | 0.57 | 3.1 | 0.45 | 2.1 |
| Meat, egg and fish | 0.78 | 4.2 | 0.42 | 2.0 |
| Sugar | 0.40 | 2.2 | 0.45 | 2.1 |
| Salt | 0.06 | 0.3 | 0.06 | 0.3 |
| Other food | 2.83 | 15.2 | 2.11 | 9.8 |
| FOOD (SUB-TOTAL) | *11.17* | *66.0* | *13.54* | *63.2* |
| Clothing | 1.13 | 9.8 | 1.66 | 7.7 |
| Fuel and light | 1.13 | 5.9 | 1.16 | 5.4 |
| Rent | 0.08 | 2.8 | 0.30 | 1.4 |
| Taxes | 0.06 | 0.2 | 0.07 | 0.3 |
| Miscellaneous | 5.07 | 15.4 | 4.71 | 22.0 |
| NON-FOOD (SUB-TOTAL) | *7.47* | *34.0* | *7.90* | *36.8* |
| TOTAL | 18.64 | 100.0 | 21.44 | 100.0 |

SOURCE: *The National Sample Survey*, Fourth Round, April-September 1952, Number 13.

### TABLE 6

### *VALUATION OF FOREIGN EXPORTS FROM THE PORTS OF COCHIN, ALLEPPEY AND CALICUT*

439

(Rs. lakhs)

| *Some important commodities of export* | *1953-54* | *1954-55* | *1955-56* | *1956-57** | *1957-58* |
|---|---|---|---|---|---|
| Cardamom | 22.44 | 32.84 | 50.17 | 54.84 | 55.90 |
| Cashew( kernels and liquids) | 927.55 | 1,014.52 | 1,155.12 | 1,112.02 | 1,141.82 |
| Coffee | 72.39 | 82.88 | 93.69 | 76.50 | 90.73 |
| Coir and Coir Products | 804.00 | 731.37 | 836.86 | 878.09 | 704.87 |
| Fish and Prawns | 102.69 | 79.34 | 31.85 | 123.86 | 149.33 |
| Ginger | 27.94 | 33.24 | 58.71 | 61.40 | 39.23 |
| Metals, Minerals, Ores | 21.56 | 22.78 | 28.93 | 77.10 | 60.77 |
| Lemon grass oil | 72.62 | 104.73 | 130.65 | 147.00 | 138.41 |
| Pepper | 962.13 | 569.81 | 378.61 | 341.69 | 295.67 |
| Tea | 1,912.96 | 2,196.86 | 1,992.17 | 1,974.75 | 2,434.78 |
| Others | 235.72 | 443.83 | 591.64 | 525.75 | 491.40 |
| *Total Value of Foreign Exports* | *5,162* | *5,312* | *5,369* | *5,343* | *5,603* |
| *Total Value of Exports to Ports of India* | *2,238* | *2,193* | *2,489* | *2,404* | *2,318* |
| **Value of Total Exports** | **7,400** | **7,505** | **7,858** | **7,747** | **7,921** |

*Value of exports from Calicut includes exports to both foreign and Indian ports.

Source: *Economic Review of Kerala*, 1959.

### TABLE 7

### *CUMULATIVE PERCENTAGE DISTRIBUTION OF NUMBER OF HOLDINGS AND LAND AREA OF HOLDINGS IN TRAVANCORE-COCHIN AREA AND THE MALABAR DISTRICT*

423
184

| *Grade of holdings* | *Travancore-Cochin* | | *Malabar* | |
|---|---|---|---|---|
| | *No. of holdings* | *Area* | *No. of holdings* | *Area* |
| Up to 1 acre | 66.72 | 16.49 | 28.91 | 2.43 |
| Up to 2.50 acres | 86.47 | 36.96 | 51.52 | 8.22 |
| Up to 5 acres | 94.84 | 57.07 | 69.55 | 17.68 |
| Up to 10 acres | 98.35 | 73.35 | 83.79 | 32.30 |
| Up to 20 acres | 99.50 | 83.50 | 93.91 | 52.58 |
| Up to 40 acres | 99.86 | 90.15 | 97.88 | 68.57 |
| Up to 100 acres | .. | .. | 99.62 | 82.37 |
| *All* | *100.00* | *100.00* | *100.00* | *100.00* |

Source: *Kerala 1959: An Economic Review*, Government of Kerala (1960).

311.

## TABLE 8

### *LAND UTILIZATION PATTERN IN KERALA*

| *Particulars of area* | *1950-51* | *1956-57* | *Per cent* (+)(—) | *Percentage of area according to professional survey 1956-57* |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| *Area According to Professional Survey* | 9,345* | 9,598 | +2.7 | .. |
| 1. Area according to Village Papers | 9,065 | 9,412 | +3.8 | .. |
| 2. Forest | 2,121 | 2,458 | +15.8 | 25.62 |
| 3. Land put to non-agriculture uses | 466 | 503 | +7.9 | 5.24 |
| 4. Barren and Unculturable land | 596 | 497 | +16.7 | 5.18 |
| 5. Total (not available for cultivation) (3+4) | 1,062 | 1,000 | —5.8 | 10.42 |
| 6. Permanent Pastures & other Grazing lands | 101 | 121 | +19.8 | 1.26 |
| 7. Land under tree crops and groves not included in N.A.S. | 430 | 508 | +18.1 | 5.29 |
| 8. Culturable waste | 720 | 437 | —39.4 | 4.55 |
| 9. Total (other uncultivated and ex-fallow land) (6+7+8) | 1,251 | 1,066 | —14.8 | 11.11 |
| 10. Fallow lands other than current fallow | 227 | 207 | —8.8 | 2.16 |
| 11. Current Fallow | 115 | 155 | +34.8 | 1.62 |
| 12. Total Fallow land (10+11) | 342 | 362 | +2.9 | 3.77 |
| 13. Net Area Sown | 4,289 | 4,525 | +28.8 | 47.16 |
| 14. Total Cropped Area | 4,975 | 5,382 | + 8.2 | 56.10 |
| 15. Area Sown more than once | 686 | 857 | +24.9 | 8.93 |

* Corresponds to 1951-52 figures.

## TABLE 9

### *VALUE YIELDED PER ACRE*

| *Name of commodity* | *Percentage value contributed* | *Percentage of gross cropped area occupied* | *Average value of produce per acre* (in Rs.) (1956) |
|---|---|---|---|
| Paddy | 23.0 | 35.8 | 211.9* |
| Pulses | 0.2 | 2.3 | 33.0 |
| Tapioca | 4.3 | 10.2 | 140.0 |
| Banana | 4.7 | 2.1 | 732.8 |
| Sugarcane | 0.7 | 0.3 | 722.2 |
| Pepper | 4.0 | 3.9 | 331.7 |
| Ginger | 1.6 | 0.4 | 1077.0 |
| Cardamom | 1.7 | 1.3 | 434.8 |
| Arecanut | 5.5 | 2.6 | 687.5 |
| Cashewnut | 2.1 | 1.7 | 408.6 |
| Coconut | 27.5 | 20.2 | 446.2 |
| Groundnut | 0.5 | 0.6 | 242.4 |
| Rubber | 3.8 | 2.9 | 425.0 |
| Coffee | 0.9 | 0.8 | 390.2 |
| Tea | 7.9 | 1.5 | 1434.3 |
| Others | 11.8 | 13.2 | 294.0 |
|  | *100* | *100* | *Gross Average—Rs. 327* |

TOTAL GROSS VALUE—Rs. 180 crores.  TOTAL CROPPED AREA—5466 thousand acres.

* Figures given in this column are average values produced per acre gross of costs of cultivation and hence are not comparable with the net average of Rs. 361 per acre mentioned previously.

11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

241
433

### TABLE 10

### *AREA AND PRODUCTION OF PRINCIPAL CROPS IN KERALA*
*(1950-51[a] AND 1958-59[b])*

| | *Area under crops* ('000 acres) | | *Percentage increase or decrease* | *Production of crops* ('000 tons) | | *Percentage increase or decrease* |
|---|---|---|---|---|---|---|
| | *1950-51* | *1958-59* | | *1950-51* | *1958-59* | |
| Rice | 1,901 | 1,894 | — 0.36 | 715 | 939 | + 31.3 |
| Jowar | 6 | 4 | — 33.3 | 3 | 7 | + 133.3 |
| Ragi | 11 | 12 | + 9.1 | 5 | 7 | + 40 |
| Other millets | 30 | 14 | — 53.3 | 3 | 2 | — 33.3 |
| Total cereals | 1,948 | 1,924 | — 1.2 | 726 | 954 | + 31.4 |
| Tur | 7 | 21 | + 200 | 1 | 4 | + 300 |
| Other pulses | 23 | 89 | + 286.9 | 1 | 13 | +1200 |
| Total pulses | 30 | 110 | + 266.6 | 2 | 17 | + 750 |
| Cereals & pulses | 1,978 | 2,034 | + 2.8 | 728 | 971 | + 33.3 |
| Sugarcane | 2 | 21 | + 950 | 4 | 35 | + 755 |
| Ginger | 30 | 22 | — 26.7 | 10 | 7 | — 30 |
| Chillies | 8 | 8 | | 2 | 2 | |
| Tobacco | | 1 | | | .. | |
| Groundnuts | 28 | 33 | + 17.8 | 14 | 15 | + 7.1 |
| Sesamum | 8 | 50 | + 525 | 1 | 5 | + 400 |
| Total oilseeds | 36 | 83 | + 130.5 | 15 | 20 | + 33.3 |
| Cotton | 18 | 21 | + 16.6 | 6 | 7 | + 16.6 |
| Tapioca | 505 | 553 | + 11 | 1,500 | 1,569 | + 4.6 |
| Total field crops | 2,578 | 2,718 | + 5.4 | 2,265 | 2,869 | + 26.6 |
| Black pepper | 173 | 224 | + 29.5 | 18 | 24 | + 33.3 |
| Cardamom | 63 | 69 | + 9.5 | 1 | 1 | |
| Rubber | 132 | 246 | + 86.3 | 12,998 | 22,158 | + 70.4 |
| Tea | 92 | 98 | + 6.5 | 24,314 | 39,737 | + 62.0 |
| Coffee | 28 | 41 | + 46.4 | 2,951 | 6,961 | + 135.8 |

[113]

[a] *Agricultural Statistics of Reorganised States* (1960), Government of India.
[b] Agricultural Department, Kerala.

## TABLE 11

### *PER ACRE YIELDS OF PRINCIPAL CROPS IN KERALA*

| Crops | *Yields Per Acre* (Lbs.) | | |
|---|---|---|---|
| | *1950-51* | *1958-59* | *Per cent* (+)/(—) |
| 1 | 2 | 3 | 4 |
| 1. Rice | 829 | 1,108 | + 33.6 |
| 2. Jowar | 1,120 | 560 | — 50.0 |
| 3. Ragi | 1,008 | 1,307 | + 30.0 |
| 4. Small Millets | 224 | 448 | + 100.0 |
| 5. Total Cereals | 829 | 1,008 | + 21.5 |
| 6. Tur | 314 | 1,405 | + 28.3 |
| 7. Other Pulses | 90 | 336 | + 273.3 |
| 8. Total Pulses | 157 | 358 | + 128.0 |
| 9. Cereals and Pulses | 896 | 963 | + 7.5 |
| 10. Sugarcane | 4,480 | 35,616 | + 695.0 |
| 11. Ginger | 739 | 806 | + 9.1 |
| 12. Chillies | .. | .. | .. |
| 13. Tobacco | .. | .. | .. |
| 14. Groundnuts | 1,120 | 1,008 | — 10.0 |
| 15. Sesamum | 291 | 269 | — 7.6 |
| 16. Total Oilseeds | 918 | 582 | — 36.6 |
| 17. Cotton | 131 | 157 | + 19.8 |
| 18. Tapioca | 6,640 | 6,352 | — 4.3 |
| 19. Total Field Crops | | | |
| 20. Black Pepper | 224 | 246 | + 9.8 |
| 21. Cardamom | | | |
| 22. Rubber | 221 | 273 | + 23.5 |
| 23. Tea | 597 | 791 | + 32.5 |
| 24. Coffee | 236 | 407 | + 72.5 |

241
312

## TABLE 12

### *AREA IRRIGATED ACCORDING TO SOURCES*

(In '000 acres)

| *Source* | *1950-51* | *Per cent to total* | *1956-57* | *Per cent to total* | *Per cent (+)/(—) (4) / (2)* |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Government Canals | 321 | 43.15 | 343 | 41.38 | + 6.8 |
| Private Canals | 68 | 9.14 | 71 | 8.57 | + 4.4 |
| *Total Canals* | *389* | *52.29* | *414* | *49.96* | + *6.4* |
| Tanks | 82 | 11.03 | 77 | 9.28 | — 6.1 |
| Wells | 26 | 3.49 | 29 | 3.49 | +11.5 |
| Other sources | 247 | 33.19 | 309 | 37.28 | +25.1 |
| TOTAL | *744* | *100.00* | *829* | *100.00* | +*11.4* |

249
433

## TABLE 13

### *AREA AND PRODUCTION OF RUBBER IN KERALA*

| *Year* | *No. of estates on 31st December* | *Area abandoned during the year* (In acres) | *New extension during the year including re-planting included in areas abandoned in the previous year* | *Total area under rubber during the year* (In acres) | *Area that has been tapped during the year* (In acres) | *Quantity of dry rubber produced* (Tons) |
|---|---|---|---|---|---|---|
| 1951 | 9,026 | 1,856 | 4,386 | 141,759 | 99,078 | 13,800 |
| 1952 | 9,186 | 2,180 | 3,819 | 143,448 | 105,762 | 15,568 |
| 1953 | 14,231 | 1,489 | 1,555 | 163,254 | 143,263 | 19,430 |
| 1954 | 14,336 | 460 | 1,769 | 165,834 | 17,711 | 18,768 |
| 1955 | 14,386 | 2,386 | 4,963 | 168,412 | 152,831 | 21,605 |
| 1956 | 18,082 | 4,381 | 13,785 | 177,826 | 150,005 | 21,079 |
| 1957 | 43,783 | 4,230 | 31,699 | 246,793 | 167,421 | 21,496 |
| 1958 | 5,005 | 2,726 | 26,558 | 270,625 | 169,492 | 22,159 |

## TABLE 14

### THE NUMBER OF REGISTERED COFFEE ESTATES ACCORDING TO SIZE AND AREA AS ON THE 31ST JULY 1958

(Area in acres)

| District | *Below 5 acres* | | *5 to 10* | | *10 to 25* | | *25 to 50* | | *50 to 100* | | *100 to 200* | | *150 to 200* | | *200 to 250* | | *250 and above* | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* | *No.* | *Area* |
| Malabar | 9,121 | 16,187 | 1,123 | 4,936 | 515 | 4,956 | 62 | 2,272 | 46 | 2,965 | 10 | 1,218 | 8 | 1,293 | 6 | 1,336 | 14 | 5,650 | 10,905 | 40,813 |
| Kottayam | 3,130 | 3,596 | 185 | 56 | 58 | 57 | 14 | 343 | 5 | 323 | 1 | 129 | 1 | 150 | .. | | 1 | 703 | 3,395 | 5,367 |
| Cochin | 5 | .. | 2 | .. | .. | .. | 1 | .. | .. | .. | 1 | 125 | 3 | 561 | 2 | | 1 | 330 | 15 | 1,016 |
| Quilon | 147 | N.A. | 2 | N.A. | .. | 30 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 149 | 30 |

*Source:* *Eighteenth Annual Report, 1957-58*, Vol. IV., Coffee Board.

[113]

245
423
184

### TABLE 17

### GROSS VALUE OF OUTPUT FROM ANIMAL HUSBANDRY IN KERALA

23
435

(Rs. lakhs)

| *Item* | *1955-56* | *1956-57* | *1957-58* |
|---|---|---|---|
| Milk consumed as such | 531 | 540 | 561 |
| Other milk products | 593 | 604 | 608 |
| Beef | 56 | 58 | 62 |
| Buffalo flesh | 18 | 19 | 20 |
| Mutton | 93 | 97 | 98 |
| Hides and Skins | 29 | 30 | 31 |
| Bones and Horns | 6 | 7 | 7 |
| Eggs | 84 | 121 | 136 |
| Poultry | 72 | 78 | 84 |
| Dung | 321 | 381 | 394 |
| Increment in stock | 96 | 113 | 116 |
| Miscellaneous | 4 | 4 | 3 |
| GROSS VALUE OF OUTPUT | *1903* | *2052* | *2120* |

[113]

SOURCE: *Regional Income of Kerala* (At current prices) 1955-56 to 1957-58: Government of Kerala (1960).

### TABLE 18

### LIVESTOCK POPULATION OF KERALA—MAJOR CATEGORIES, 1951 AND 1956

231

| *Category* | *Total* | | *Percentage of increase (+) or decrease (—) in 1956 over 1951* |
|---|---|---|---|
| | *1951* | *1956* | |
| Cattle | 2,151,522 | 2,510,376 | + 16.7 |
| Buffaloes | 444,368 | 487,653 | + 9.7 |
| Sheep | 423,513 | 97,820 | — 76.9 |
| Goats | 423,345 | 955,570 | + 125.7 |
| Horses and Ponies | 518 | 1,690 | + 226.2 |
| Mules | 14 | 2 | — 85.7 |
| Donkeys | 689 | 1,415 | + 105.2 |
| Pigs | 117,932 | 113,711 | — 3.6 |
| TOTAL LIVESTOCK | *3,561,901* | *4,168,237* | + *17.1* |
| Fowls | 3,854,319 | 6,462,799 | + 67.6 |
| Ducks | 263,147 | 322,085 | + 26.2 |
| Others | .. | 161 | .. |
| TOTAL POULTRY | *4,117,466* | *6,785,045* | + *65.1* |

235

[113]

SOURCE: *Statistical Outline of Kerala State, 1960.*

[Pp. 280-282 not Processed]

000

## TABLE 19

### NUMBER OF COWS AND SHE-BUFFALOES IN MILK PER THOUSAND POPULATION IN KERALA AND OTHER INDIAN STATES

[231]
[234]

| State | Number of cows and she-buffaloes in milk in 1956 | |
|---|---|---|
| | Total number | Rate per thousand population of the State |
| Andhra Pradesh | 3,017,305 | 89 |
| Assam | 1,012,055 | 96 |
| Bihar | 2,592,908 | 63 |
| Bombay | 4,277,810 | 81 |
| Jammu & Kashmir | 318,105 | 666 |
| Kerala | 457,711 | 430 |
| Madhya Pradesh | 4,087,860 | 148 |
| Madras | 1,716,664 | 53 |
| Orissa | 1,950,792 | 91 |
| Punjab | 694,638 | 45 |
| Rajasthan | 2,175,132 | 123 |
| Uttar Pradesh | 3,149,353 | 150 |
| West Bengal | 1,628,996 | 76 |
| Delhi | 57,156 | 27 |
| Himachal Pradesh | 233,079 | 208 |
| Manipur | 32,394 | 52 |
| Tripura | 67,792 | 105 |
| Andaman and Nicobar Islands | 1,416 | 35 |
| ALL-INDIA | *31,906,171* | *88* |

231

## TABLE 20

### *CATTLE AND BUFFALOES IN KERALA (CATEGORIES) 1956*

| Categories | Cattle (in '000 numbers) | Buffaloes (in '000 numbers) | Total (in '000 numbers) |
|---|---|---|---|
| 1. Males over 3 years | *620* | *279* | *899* |
| (*i*) Breeding | 11 | 4 | 15 |
| (*ii*) Working | 571 | 268 | 839 |
| (*iii*) Others | 38 | 7 | 45 |
| 2. Females over 3 years | *1002* | *142* | *1144* |
| (*i*) Breeding | | | |
| (*a*) In milk | 398 | 63 | 461 |
| (*b*) Dry and not calved | 577 | 65 | 642 |
| (*ii*) Working | 8 | 11 | 19 |
| (*iii*) Miscellaneous | 19 | 3 | 22 |
| 3. Young stock | *914* | *94* | *1008* |
| TOTAL | 2536 | 515 | 3051 |

SOURCE: *Indian Livestock Statistics, 1953-54 to 1955-56*, Ministry of Food and Agriculture.

[113]

## TABLE 21

### *NUMBER OF VETERINARY INSTITUTIONS IN KERALA STATE (1958-59)*

232
634

| *District* | *Hospitals* | *Dispensaries* | *Stockman's stations* | *Inspectors' stations* |
|---|---|---|---|---|
| Trivandrum | 5 | 3 | .. | .. |
| Quilon | 5 | 7 | .. | .. |
| Alleppey | 6 | 5 | .. | .. |
| Kottayam | 5 | 4 | .. | .. |
| Ernakulam | 9 | 12 | .. | .. |
| Trichur | 7 | 13 | 4 | .. |
| Palghat | 5 | 8 | .. | 8 |
| Kozhikode | 2 | 10 | .. | .. |
| Cannanore | 1 | 7 | .. | 3 |
| TOTAL | *45* | *69* | *4* | *11* |

SOURCE: Director of Animal Husbandry, Trivandrum.

11: India G-4, 5 (1960-1961) 1962 AW11 Kerala AW11

162
464
634

## TABLE 58

### DENSITY OF POPULATION (KERALA STATE)

(Figures based on 1951 Census)

| District | | Participation rate (Per cent) | Density of population | |
|---|---|---|---|---|
| Trivandrum | Travancore-Cochin | 36.2 | 1,369 | |
| Quilon | | | 749 | |
| Alleppey | | | 2,148 | |
| Kottayam | | | 664 | |
| Ernakulam | | | 982 | |
| Trichur | | | 1,188 | |
| Palghat | | 28.5 | 793 | 783 |
| Kozhikode | | | 809 | |
| Cannanore | | | 618 | |
| STATE TOTAL | | | 904 | |

Palghat, Kozhikode and Cannanore formed the previous districts of Malabar.

162
464
171

## TABLE 59

### OCCUPATIONAL BREAK-UP OF WORKING FORCE (1961)

| | KERALA | | | | | | INDIA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | | Urban | | Combined | | Rural | | Urban | | Combined | |
| | Lakhs | Percentage | Lakhs | Percentage | Lakhs | Percentage | Lakhs | Percentage | Lakhs | Percentage | Lakhs | Percentage |
| Agricultural Sector | 22.3 | 60.3 | 1.1 | 18.9 | 23.4 | 51.4 | 990 | 81.8 | 30 | 18.9 | 1,020 | 71.8 |
| Non-agricultural Sector | 17.3 | 39.8 | 4.7 | 81.1 | 22.0 | 48.6 | 218 | 18.2 | 184 | 81.1 | 402 | 28.2 |
| TOTAL | *39.6* | *100.0* | *5.8* | *100.0* | *45.4* | *100.0* | *1,208* | *100.0* | *214* | *100.0* | *1,422* | *100.0* |

[PP. 286–309 not Processed]

162
464
184

## TABLE 60

### *UNEMPLOYMENT POSITION IN KERALA*

| *Activity status* I | *Travancore-Cochin* II | | *Malabar* III | | *Kerala* IV=II+III | |
|---|---|---|---|---|---|---|
| | *Absolute number* (In lakhs) | *Percentage to total population* | *Absolute number* (In lakhs) | *Percentage to total population* | *Absolute number* (In lakhs) | *Percentage to total population* |
| (*a*) Below 15 years age | 41.3 | 40.7 | 20.7 | 36.9 | 62.0 | 39.4 |
| (*b*) Above 15 years | 60.2 | 60.1 | 35.3 | 63.0 | 95.5 | 60.6 |
| 1. Students | 4.0 | 4.0 | 1.2 | 2.1 | 5.2 | 3.3 |
| 2. Disabled or too old | 4.6 | 4.5 | 3.2 | 5.7 | 7.8 | 4.9 |
| 3. Pensioners or Rentiers | 1.1 | 1.4 | 0.5 | 0.4 | 1.2 | 0.8 |
| 4. Having Regular Employment | 19.7 | 19.6 | 9.8 | 17.5 | 29.5 | 18.7 |
| 5. Household Workers | 19.2 | 19.0 | 10.9 | 19.4 | 30.1 | 19.1 |
| 6. Casual Workers | 9.1 | 8.0 | 7.2 | 12.1 | 15.2 | 9.6 |
| 7. People in search of employment | 3.7 | 3.6 | 2.9 | 5.9 | 6.6 | 4.2 |
| TOTAL POPULATION | *101.5* | *100* | *56.0* | *100* | *157.5* | *100* |
| LABOUR FORCE (4+6+7) | *31.4* | *30.9* | *19.87* | *35.5* | *51.2* | *32.5* |
| Category (7) as percentage of labour force | *3.7* | *11.62* | *2.9* | *14.64* | *6.66* | *12.79* |

SOURCE: The Statistics Department, Government of Kerala.

464
162

## TABLE 61

### *COMPARATIVE SECTORAL DISTRIBUTION OF WORKING FORCE*

| *Sector* | *Proportion of working force* 1956 | 1971 |
|---|---|---|
| 1. Primary Sector | 54.9 | 42.2 |
| 2. Secondary Sector | 19.3 | 24.6 |
| (*a*) Factory Sector | 3.4 | 9.2 |
| (*b*) Non-factory Sector and Mining | 15.9 | 15.4 |
| 3. Tertiary Sector | 25.8 | 33.2 |
| TOTAL | *100.0* | *100.0* |

11: India G-4,.5 (1960-1961) 1962 AW11 Kerala AW11

## TABLE 62

167

### *EMIGRATION FROM AND IMMIGRATION TO OTHER PARTS OF INDIA*

| *Year* | *Number of* | | *Percentage of population* | | |
|---|---|---|---|---|---|
| | *Immigrants* | *Emigrants* | *Immigrants* | *Emigrants* | *Balance* |
| 1901 | 82,023 | 16,346 | 2.18 | 0.43 | 1.75 |
| 1911 | 83,278 | 26,112 | 1.91 | 0.60 | 1.31 |
| 1921 | 88,603 | 29,025 | 1.78 | 0.58 | 1.20 |
| 1931 | 164,389 | 48,503 | 2.61 | 0.77 | 1.84 |
| 1951 | 206,823 | 205,816 | 2.23 | 2.22 | 0.01 |

SOURCE: *Census of India, 1951*, Travancore-Cochin, Part 1 A, Report.

## TABLE 63

433
652
454

### *INVESTMENT DURING THE COMING DECADE (1960-61 to 1970-71)*

| *Items* | *State sector* (Rs. crores) | *Centre and private* (Rs. crores) | *Total* (Rs. crores) | *Percentage share to total investment* | *Percentage share, All-India Third Plan* |
|---|---|---|---|---|---|
| 1. Agriculture | 51.7 | 56.0 | 107.7 | 10.8 | 20.8 |
| 2. Plantations | 50.6 | 129.0 | 179.6 | 18.1 | |
| 3. Forests | 5.7 | .. | 5.7 | 0.6 | |
| 4. Animal Husbandry | 2.6 | .. | 2.6 | 0.3 | |
| 5. Fisheries | 2.5 | 8.3 | 10.8 | 1.1 | |
| 6. Minerals | 0.5 | 0.4 | 0.9 | 0.1 | |
| PRIMARY SECTOR | *113.6* | *193.7* | *307.3* | *30.9* | |
| 7. Factory Industries | 31.2 | 114.1 | 145.3 | 14.6 | 28.8 |
| 8. Small Scale Sector | 14.0 | 28.0 | 42.0 | 4.3 | |
| 9. Non-factory Sector | .. | 18.6 | 18.6 | 1.9 | |
| SECONDARY SECTOR | *45.2* | *160.7* | *205.9* | *20.8* | |
| 10. Power | 102.0 | .. | 102.0 | 10.3 | 9.5 |
| 11. Transport | 70.0 | 28.4 | 98.4 | 9.9 | 16.2 |
| 12. Social Services | 65.0 | 100.8 | 165.8* | 16.6 | 16.9 |
| 13. Inventories | 15.0 | 60.0 | 75.0 | 7.5 | 7.8 |
| 14. Rural Public Works | 40.0 | .. | 40.0 | 4.0 | |
| TERTIARY SECTOR | *292.0* | *189.2* | *481.2* | *48.3* | *50.4* |
| GRAND TOTAL | 450.8 | 543.6 | 994.4 | 100.0 | 100.0 |
| | +47.0 | —47.0 | | | |
| Loans from State Government to the Private Sector | 497.8 | 496.6 | | | |

* Investment in social services has been derived from the Third Plan estimates (all-India) by assuming the same per capita investment as in all-India.

824
313

## Appendix 5

# Lists of Trees and other Produce Found in Kerala Along with their Present Uses

*E* denotes Evergreen; *D* denotes Deciduous; *H* denotes Hardwood; *S* denotes Softwood

| | *Malayalam name* | *Botanical name* | *E* or *D* | *S* or *H* | *Uses* |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 1. | *Teak* | *Tectona grandis* | D | H | Construction, furniture |
| 2. | *Mathi (Thembavu)* | *Terminalia tomentosa* | D | H | Construction, sleepers, etc. |
| 3. | *Marudu* | *Terminalia paniculata* | D | H | -do- |
| 4. | *Venteak* | *Larger stromia Lanceolata* | D | H | Boat-building, ceilings |
| 5. | *Venga* | *Pterocarpus Marsupium* | D | H | Building construction good substitute for teak |
| 6. | *Manjakadamba* | *Adina cordifolia* | D | H | Bobbins and furniture |
| 7. | *Rosewood* | *Dalbergia latifolia* | D | H | Furniture, plywood, export size above 72" midgirth |
| 8. | *Chadachi (Unnam)* | .. | D | H | Furniture |
| 9. | *Kunnivaga* | *Albizia Odoratissima* | D | H | Building construction |
| 10. | *Ayini or (Anjili)* | *Artocarpus hirsuta* | E | H | -do-, Good substitute for teak, boat-building furniture |
| 11. | *Irimbagam or (Nangu)* | *Mesua Ferrea* | E | H | Sleepers |
| 12. | *Mahogany* | *Swietina macrocarpa* | E | H | Furniture |
| 13. | *Wattle* | *Acacia molissima* | D | H | Being introduced for tan bark |
| 14. | *Ambazham* | *Spondeats mangifera* | D | S | Packing cases |
| 15. | *Cheeni* | *Tetrameles nudiflora* | E | S | Packing cases |
| 16. | *Mani Maruthi* | *Lagerstroemia flosreginae* | E | S | Building construction |
| 17. | *Cherapine* | *Hardwickia binata* | D | H | Packing cases, plywood |
| 18. | *Chuvannagil* | *Cedrela toona* | D | H | Furniture |

(Continued)

[PP 313-328 not Processed]

313
314
824

**Appendix 5** *(Continued)*

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| 19. *Mula* | *Dendrocalamus* | | | Bamboos for cheap housing, raw material for paper and rayon |
| 20. *Pala* | *Alstonia scholaris* | E | S | Packing cases |
| 21. *Irul* | *Xylia Xylocarpa* | D | H | Railway sleepers, building construction |
| 22. *Kalpine* | *Dipterocarpus indicus* | E | S | Plywood |
| 23. *Konna* | *Cassia fistula* | D | S | Tanning |
| 24. *Vellangil (white cedar)* | *Dysoxylum malabaricum* | E | H | Plywood and furniture |
| 25. *Nellika* | *Phyllanthus emblica* | E | H | Fruits for pickling and for Ayurvedic medicines |
| 26. *Maravetti* | *Hyprocarpus wightiana* | E | H | Soap-making, oil used for lighting purpose |
| 27. *Ete reed* | *Ochlandra Travancoria and Reedi* | | | Raw material for paper |
| 28. *Padiri* | *Stereospermum Chelanoidis* | E | S | Packing cases |
| 29. *Pilavu* | *Artocarpus integrifolia* | D | H | Building construction, boat-making, furniture, etc. |
| 30. *Poola (Elavu)* | *Salmalia Malabaricum* | D | S | Matchwood, cotton used for pillows |
| 31. *Poovam* | *Schleichera trijguga* | D | H | For lac cultivation |
| 32. *Punna* | *Calophylum tomentose* | E | H | Plywood and cheap timber for construction purposes |
| 33. *Kambagam* | *Hopea parviflora* | E | H | Building construction, sleepers, etc. |
| 34. *Vakkai* | *Sterculia Villosa* | | | Cember Bark (fibre) used for making ropes for timber dragging purposes |
| 35. *Chakkala* | *Calenia excelsa* | E | S | Plywood |
| 36. *Vellapine* | *Vateria indica* | E | S | A favourite plywood species |
| 37. *Mathi* | *Ailanthus malabaricum (excelsa)* | D | S | Matchwood |
| 38. *Pali* | *Palaquim Elipticum* | E | S | Plywood |
| 39. *Kulamavu* | *Machilus Macrantha* | E | S | -do- |
| 40. *Mavu* | *Mangifera indica* | E | S | Plywood, boat-building, packing cases |
| 41. *Kalamaicha* | *Anacolosa densiflora* | E | S | Plywood |
| 42. *Kayari (chera)* | *Cullenia excelsa* | E | S | -do- |
| 43. *Shurali* | *Hardwickia Pinnata* | E | S | -do- |

*(Continued)*

Appendix 5 (Continued)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| 44. .. | *Eucalyptus grandis* | E | S | Pulp timber |
| 45. *Blue gum* | *E. Globulus* | E | S | Pulp timber |
| 46. *Cashew* | *Anacardium Occidentale* | E | H | Nuts and apple |
| 47. *Kadukka* | *Terminalia Chebula, and belerica* | D | H | Myrobalans |
| 48. *Punnappamaram* | *Delenia pentagyna* | D | H | House construction |
| 49. *Vekkali* | *Anogessis latifolia* | D | H | Mine props |
| 50. *Nedunar* | *Polialthia fragrans* | E | S | Masts and packing cases |
| 51. *Nedunar* | *Polialthia fragrans* | E | H | Cabinet-making and furniture |
| 52. *Malaveppu* | *Chukrasia tabularis* | E | H | -do- |
| 53. *Chenkurunthi* | *Elattravancoria* | E | H | -do- |
| 54. *Venkotta* | *Lophopetlum wightianum* | E | S | Plywood |
| 55. *Puli* | *Tamarindus indica* | D | E | Fruit good glue material, Bobbins |
| 56. *Aval* | *Holoptelea integrifolia* | E | S | Box and packing cases |
| 57. *Black dammar* | *Canarium strictum* | E | S | Packing cases |
| 58. *Papitta* | *Sterculia campanulata* | E | S | Matchwood, packing cases |
| 59. *Kambli (Nasakam)* | *Evodia roxburghiana* | E | S | Matchwood |
| 60. *Vella Kanadamba* | *Hymenodicton excelsa* | D | S | Bobbins |
| 61. *Poovarasu* | *Thespesia populnea* | D | H | Shuttles |
| 62. *Dantapala* | *Wightia tinctoria* | D | H | Combs, and carvings |
| 63. .. | *Gmelina arborium* | D | H | Musical instruments |
| 64. *Pungu* | *Pongamia glabra* | D | H | Oil seeds |
| 65. *Mulayini* | *Bridelia retusa* | D | H | Tans and dyes |
| 66. *Chandu* | *Caesalpinia sappan* | D | H | Dyes |
| 67. *Udi* | *Odina wodier* | D | H | Gum used for curving fishermen's nets |

SOURCE : Department of Forests, Government of Kerala.

## Appendix 6

## Statement Showing Outturn of Minor Forest Products During 1958-59

| *Items* | *Unit* | *By Government agency* | | *By purchasers* | | *Total Amount* (Rs.) |
|---|---|---|---|---|---|---|
| | | *Quantity* | *Amount* (Rs.) | *Quantity* | *Amount* (Rs.) | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A. Cardamom lease | lbs. | 159 | 320.50 | | 21191.68 | 23512.18 |
| B. Honey (Big bees) | Tons | .. | .. | 244 | | .. |
| -do- (Small bees) | | .. | .. | .. | .. | .. |
| Wax | | .. | .. | .. | .. | .. |
| C. Ivory-Tusks | lbs. | 1565.75 | 32483.00 | .. | .. | 32483.00 |
| Serivelloes | lbs. | 51.80 | 226.00 | .. | .. | 226.00 |
| Elephant teeth | lbs. | 88.00 | 25.62 | .. | .. | 25.62 |
| Bamboo | No. | 6607 | 620.12 | 6617.08 | 66720.99 | 67341.11 |
| D. Bamboos | | | | | | |
| ,, Chillies | Head loads | .. | .. | 163 | 7.24 | 7.24 |
| ,, Chillies | No. | .. | .. | 29100 | 582.00 | 582.00 |
| ,, Thorns | Head loads | .. | .. | 324 | 40.00 | 40.00 |
| ,, Thanayam Bamboo | No. | .. | .. | 50 | 1.50 | 1.50 |
| ,, Local Mongal | No. | .. | .. | 109800 | 6588.00 | 6588.00 |
| ,, Kalmoggal | No. | .. | .. | 54800 | 4392.00 | 4392.00 |
| Split Bamboo | No. | .. | .. | 2950 | 142.50 | 142.50 |
| Sale of bamboo coupes | | .. | .. | .. | 20355.00 | 20555.00 |
| Reeds (Pass) | No. | 4050 | 20251 | 1860393 | 72698.64 | 72718.89 |
| (Air dry) | No. | .. | .. | 1600025 | 6000.42 | 6000.62 |
| (Air dry) | Tons | .. | .. | 3975-1796<br>Tons Cwt. lbs. | 11928.67 | 11928.67 |
| (Ticket) | No. | .. | .. | 227010 | 908.04 | 908.04 |
| (Leases) | No. | .. | .. | 9750 | 5130.50 | 5130.50 |
| E. Rattans (Round) | No. | 25 | 0.50 | 765970 | 13812.70 | 13813.20 |
| (Split) | No. | .. | .. | 73315 | 41313.90 | 41313.90 |
| Sales of Rattan coupes | | .. | .. | .. | 31580.00 | 31580.00 |
| F. Miscellaneous | | | | | | |
| (1) Vekka | | | .. | .. | 4845.89 | 4845.89 |
| (2) Vekka fibre | Head loads | .. | .. | 2706 | 985.25 | 985.25 |
| (3) Kynansticks | Cart loads | .. | .. | 5 | 3.75 | 3.75 |
| (a) -do- fibre | Head loads | .. | .. | 3 | 0.57 | 0.57 |
| (4) Kulavoo oil | .. | .. | .. | .. | .. | .. |
| (5) Manwoo leaves | Head loads | .. | .. | 5078 | 311.06 | 311.06 |
| (e) -do- | Cart loads | .. | .. | 968 | 966.00 | 966.00 |

(Continued)

Appendix 6 (Continued)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| (6) Metal | Cart loads | .. | .. | 42400 | 477.00 | 477.00 |
| (a) -do- | Cart loads | .. | .. | 1077.5 | 576.25 | 576.25 |
| (7) Rubber | | .. | .. | .. | 2826.85 | 2826.75 |
| (a) -do- | lbs. | .. | .. | 1418 | 708.75 | 708.75 |
| (8) Gravel | Cart loads | .. | .. | 287 | 71.75 | 71.75 |
| (9) Laterite | Cart loads | .. | .. | 1081.5 | 32.87 | 32.87 |
| (10) Sand and Earth | Cubic feet | .. | .. | 9475 | 146.12 | 146.12 |
| (a) -do- | Cart loads | .. | .. | 593 | 148.25 | 148:25 |
| (11) Thatching grass | Cart loads | .. | .. | 279.5 | 279.86 | 279.86 |
| (a) -do- | Head loads | 416 | 26.0 | 999 | 351.17 | 371.17 |
| (12) Grassing fee | | | 437.00 | | 37169.75 | 37606.75 |
| (13) Minor forest produce lease | | .. | 735.00 | .. | 83611.38 | 83611.38 |
| (14) Rubber Dn. Lease | | .. | .. | .. | 2123.00 | 2123.00 |
| (15) Taungya Lease | | | 8291.10 | .. | 49627.50 | 57918.60 |
| (16) Cashew plantation lease | | .. | 5635.00 | .. | 2401.00 | 8036.00 |
| (17) Food production lease | | .. | .. | .. | 28258.94 | 28258.94 |
| (18) Miscellaneous lease | | | 380.88 | | 2147.38 | 2728.26 |
| (19) Koona leaves | Head loads | .. | .. | 25 | 1.56 | 1 56 |
| (20) J.N. Poles | No. | 25 | 20.00 | 5820 | 1580.00 | 1600.00 |
| (21) J.N. Twigs | | | | .. | .. | .. |
| (22) Creepers | | | | | | |
| (23) Thai Posts | | | | | | |
| (24) Fodder grass | | | | | | |
| (25) Eauthal Leaves | | | | | | |
| (26) Penning fee | | | | | | |
| (27) Kanakamukw | No. | .. | .. | 117945 | 1179.25 | 1179.25 |
| (28) Wild plantation leaves | | .. | .. | 5 | 0.31 | 0.31 |
| (29) Ginger | | .. | .. | .. | .. | .. |
| (30) Groves & bondlers | cft. | .. | .. | 8950 | 181.00 | 181.00 |
| (31) Coconut tope lease | | .. | .. | .. | 11873.00 | 11873.00 |
| (32) Tac | lbs. | 192.00 | 192.00 | .. | .. | 192.00 |
| (33) Seeds | lbs. | 378 | 94.50 | .. | .. | 94.50 |
| (34) Grass and leaves | Sheaves | 49250 | 493.00 | .. | .. | 493.00 |
| (35) Elephant tail hair | No. | 200 | 300.00 | .. | .. | 300.00 |
| (36) Land lease | Acres | .. | .. | 368.68 | 2236.31 | 2239.31 |
| (37) Site lease | | .. | .. | 6.70 | 30.00 | 30.00 |
| (38) Road tax | .. | .. | .. | .. | 4150.00 | 4140.00 |
| (39) Elephant liver | .. | .. | .. | .. | 163.34 | 163.34 |
| (40) Vekka drag ropes | Nos. | .. | .. | 30881 | 7720.25 | 7720.25 |
| (41) Value of pit fallen animals | | .. | .. | | 57.00 | 57.00 |
| (42) Amlala | Head loads | .. | .. | 4 | 0.25 | 0.25 |
| (43) Ithy Boeck | No. | .. | .. | 6 | 1.50 | 1.50 |
| (44) Miscellaneous sales | .. | .. | 93.00 | .. | .. | 93.00 |
| (45) Teak stump | .. | .. | .. | 2 | 20.00 | 20.00 |
| (46) Departmental compound Lease | | .. | .. | .. | 780.23 | 780.23 |
| (47) Pepper | lbs. | .. | .. | 30 | 30.00 | 30.00 |
| (48) Bamboo 30' (Export) | No. | .. | .. | 5800 | 1044.00 | 1044.00 |
| (49) Reeds (export) | No. | .. | .. | 245700 | 2456.00 | 2456.00 |
| (50) Other items | .. | .. | .. | .. | 1353.66 | 1353.66 |
| TOTAL | | | *50,896.47* | | *619,961.98* | *689,361.45* |

[Pp. 334 — 367 not processed ]

11: India
433

AW11 Kerala AW11

/For further information on economic development and planning, including the part and potential productive capacity of agriculture and various industries in Kerala, see category 116, pp. vi-viii, 9-13, 15-21, 25, 28-65, 72-125, 128, 130, and 133-138./

/Information on the "enangar" as several cooperative linked lineages, will be found in category 613./

113,
171
464

/For a comparison of statistical data and general information regarding employment and unemployment in the state of Kerala vs. India as a whole, see 11: India, AW11 Kerala File, category 116, pp. 206-215./

561

/Information on the participation of pre-pubescent girls as a body in the Tali-tying (Talikettu Kalyanan) ceremony, will be found in category 588./

Kerala AW11
Nayar

564
592
613
614

/For information on the function of the Taravād as a clan, lineage and matrilineal household unit, the researcher is advised to check all three categories listed above./

585

/Information on the Tali ceremony as a form of temporary pre-pubescent ritual marriage for the Nayar and Tiyyar girl will be found in category 588./

592
596

/Information on the *tarawad* as a matrilineal joint family will be found in category 613./